"A PROSPECTIVE CLINICAL STUDY OF PSEUDO CYST OF PANCREAS IN CMCH, COIMBATORE"

Dissertation submitted in Partial fulfilment of the regulations required for the award of

M.S. DEGREE

In

General Surgery Branch - I

THE TAMILNADU

DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI

APRIL, 2014

CERTIFICATE

This is to certify that this dissertation titled "**A Prospective clinical study of pseudo cyst of pancreas in CMCH, Coimbatore**" submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfilment of the requirement for the award of M.S Degree Branch - I (General Surgery) is a bonafide work done by Dr.A.Sivakumar, post graduate student in General Surgery under my direct supervision and guidance during the period of November 2012 to November 2013.

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I hereby declare that the dissertation entitled **"A prospective clinical study of pseudo cyst of pancreas in CMCH, Coimbatore"** was done by me at Coimbatore Medical College Hospital Coimbatore – 641018 during the period of my post graduate study for M.S. Degree Branch-1 (General Surgery) from 2012 to 2013.

This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University in partial fulfilment of the University regulations for award of M.S., Degree in General Surgery.

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ACKNOWLEDGEMENT

I express my sincere thanks to **Dr.R.Vimala M.D**., Dean, Coimbatore Medical College.

It's my pleasure to express my deep sense of gratitude and sincere thanks to professor **Dr.S.Natarajan** ,department of general surgery, Coimbatore medical college, Coimbatore, for his indefatigable efforts, dedicated professionalism cheerful guidance and constant encouragement during the course of my study and preparation of this dissertation, who has guided me in all aspects of my post graduation. He is also a counselor and philosopher who have teached every aspects of surgery.

I am extremely grateful and highly indebted to professor **Dr.V.Elango** head of the department of general surgery, Coimbatore medical college, Coimbatore, who has been a tower of strength for motivating me during the course of my study.

I am highly indebted to professor **Dr.P.V.Vasanthakumar** former head of the department of surgery whose practical guidance during the course of my study is without parallel.

My sincere thanks to my professors **Dr.P.Swaminathan, Dr.D.N.Renganathan, Dr.G.Ravindran and Dr.S.Saradha** for allowing me to collect cases from their units and for their valuable guidance.

I would like to thank my registrar **Dr.Srinivasan** and my assistant professors **Dr.R.Narayanamoorthy, Dr.S.Meenaa, Dr.S.Durairaj, Dr.N.Tamilselvan, Dr.Venkatesh, Dr.Vishwanathan, Dr.S.Muthu lakshmi, Dr.Radhika, Dr.Umashankar, Dr. Sumithra, Dr.Angeline Vincent, Dr.S.Karthikeyan, Dr.Jeyakumar** for their guidance, suggestions and advice during the course of my study and preparation of this dissertation.

I would like to thank my parents' shri **K.Adhimoolam, smt.R.Sampoornam,** my brother **Selvakumar,** my sister **Boopathy** for their immense support.

I am also thankful to **Mr.sivasailam** (late) chairman, **Mr.Hendrikson** correspondent Chamraj group of companies for their help and moral support during my study.

I am also thankful to my teachers Chamraj elementary and higher secondary school for their guidance during my school days.

Lastly, I thank everyone concerned, including my friends, relatives, staffs and patients for their co-operation, without whom this dissertation would have ever materialized.

Date :
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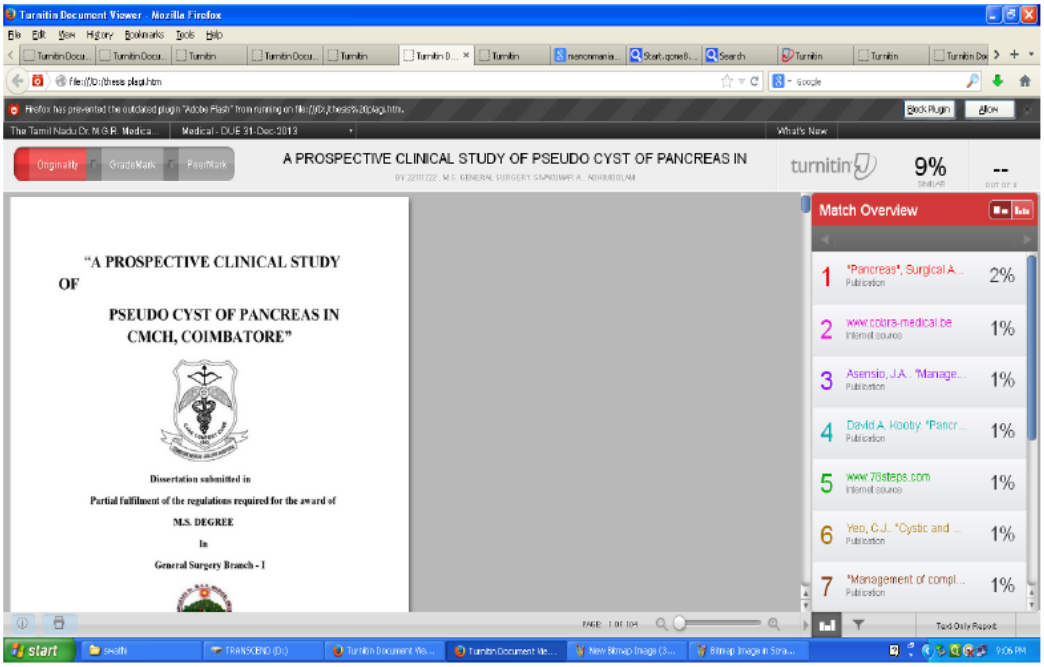
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E-mail	svk.kumar9@gmail.com
Submission time	16-Dec-2013 01:16PM
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"A PROSPECTIVE CLINICAL STUDY OF PSEUDO CYST OF PANCREAS IN CMCH, COIMBATORE" Dissertation submitted in Partial fulfilment of the regulations required for the award of M.S. DEGREE In General Surgery Branch - I THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI APRIL, 2014. 1 CERTIFICATE This is to certify that this dissertation titled "A Prospective clinical study of pseudo cyst of pancreas in CMCH, Coimbatore" submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfilment of the requirement for the award of M.S Degree Branch - I (General Surgery) is a bo- nafide work done by Dr.A.Sivakumar, post graduate student in General Surgery under my direct supervision and...

LIST OF ABBREVATIONS USED

ESR	Erythrocyte sedimentation rate
EUS	Endoscopic ultrasound
MRCP	Magnetic resonance cholangiopancreaticography
PTC	Percutaneous transhepatic cholangiogram
USG	Ultrasonogram
CT	Computed tomogram

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ABSTRACT

BACKGROUND AND OBJECTIVE:

Pseudocyst of pancreas is a complication of acute or chronic pancreatitis. It occurs in 5-15% of patients. It takes about 4-8 weeks to develop. Inspite of aggressive treatment and recent advances in the management of acute pancreatitis there is increased incidence of pancreatitis and related complications. Hence I chose to study the incidence, clinical profile, diagnosis and outcome of various modalities of treatment of pseudocyst of pancreas.

METHODS:

30 Patients were selected from general surgery outpatient and inpatient department of Coimbatore Medical College and Hospital (CMCH). Detailed history and thorough clinical examination has made and recorded. Basic and definitive investigations were done. Patients were managed by various modalities like conservative, percutaneous, laparoscopic and endoscopic drainage, surgeries like cystogastrostomy, cystojejunostomy and cystoduodenostomy. Data like duration of hospital stay, results of conservative and or surgical management and their complications if any, size of pseudo cyst on follow-up were collected. The final outcome is observed in terms of most common age group and gender affected most common etiology symptom, sign, risk factor,

associated complications and treatment given in CMCH, Coimbatore set up and follow-up findings.

RESULTS:

Majority of patients belongs to the age group of 31-50 which constituted 19 patients in this study with male: female ratio of 5:1. Alcohol consumption was the most common etiological factor. Patient's most common presentation was abdominal pain and tenderness. Clinically mass was palpable in 66.6% of the patients studied but USG and CT scan detected pseudo cyst in all patients. Conservative management was effective in uncomplicated pseudo cyst till they regress or mature when surgical intervention could be done. The result of internal drainage was excellent which was done in 43.3% of patients. The most common post operative complications include pain abdomen and wound infection and was seen in 26.6% of patients in this study.

INTERPRETATION AND CONCLUSION:

Pseudo cyst of pancreas is the most common complication following acute pancreatitis. Early diagnosis and timely intervention with the use of serial USG and internal drainage for mature cyst, external drainage for complicated cyst results in good prognosis.

KEY WORDS:

Pseudo cyst of pancreas, USG, CT, internal drainage, external drainage.

INTRODUCTION

The gland Pancreas is the most unforging organ that lead most surgeons to avoid palpating it unless if necessary. It is Located in the retroperitoneum in the “c” loop of duodenum.

The recent rapid development of non invasive imaging techniques helps in the better understanding of pancreatic disease and its pathology.

Inflammation of parenchyma of pancreas is called as pancreatitis. It may be acute or chronic. In acute pancreatitis symptoms appear suddenly in a previously healthy individual and the symptoms disappear once the disease subsides. But in chronic pancreatitis the patient may had prior attacks or symptoms of pancreatic insufficiency before the current attack, and their symptoms persists even after the attack.

Ability to study these lesions noninvasively at variable point in time allow us to differentiate between acute and chronic pseudo cyst two seemingly similar entities with different natural history and treatment requirement.

OBJECTIVES

- To observe the various etiological factors, age and sex distribution of pseudo cyst of pancreas.
- To establish accurate diagnosis by various investigation.
- To observe the outcome of various treatment modalities.

REVIEW OF LITERATURE

HISTORICAL REVIEW

Pseudo cyst of pancreas was first described by morgagni in 1761[1]. Bozeman did the first surgery in 1882 who excised a pseudo cyst measuring ten kg from the 41years old wife of a Texan physician.

Gussenbauer did the first draining procedure in 1883; there he marsupialized a cyst to provide an external drainage.

Pseudocystogastrostomy was first introduced in 1921 cystoduodenostomy in 1928, cystojejunostomy in 1931.

Surgical drainage remains the primary mode for treating pseudo cyst. Nowadays percutaneous drainage of uncomplicated pseudo cyst is carried out under USG or CT guidance.

Pseudo cyst located adjacent to the duodenum and or stomach is drained endoscopically using diathermy to create an internal fistula.

Currently, drainage of the cyst is being done by disrupting the peripancreatic or pancreatic fluid collection.

In a study of 71 cases with pseudo cyst, internal drainage was done in 73% of patients and the study concluded that internal drainage was the treatment of choice via either cystogastrostomy or cystojejunostomy. [2]

In a study regarding the timing of intervention, they concluded that prolonged waiting is unnecessary and expensive in case of chronic pancreatitis if there is no acute attack. But it is worth to wait and observe in a case of pseudo cyst following acute pancreatitis. [3]

A study of cause, therapy and results of pancreatic pseudo cyst concluded that pseudo cyst remains the most common complication of pancreatitis and infected cyst associated with major postoperative morbidity. CT and USG is the mainstay of diagnosis, surgical therapy is safe but associated with significant rate of morbidity and mortality. [4]

In a study of pseudo cyst that develops in a patient with chronic pancreatitis is unlikely to resolve spontaneously if it is mature. However if a mature cyst is asymptomatic and is less than 5 cms, they probably requires no treatment. [5]

Since serious complications occurs in larger cyst, these patient should be followed and the cyst to be revaluated at 3-6 months interval with USG.

In a study of 299 patients on impact of technology on the management of pseudo cyst, they came to the conclusion that recent technology permits cautious exploration and selective drainage while avoiding laparotomy. [6]

Classification of pseudo cyst according to A.D. Egidio and M.Schein study:

The classification is on the basis of type of pancreatitis (acute or chronic). [7]

Group I: Acute post necrotic pseudo cyst with normal duct. Percutaneous drainage was curative.

Group II: post necrotic pseudo cyst with ductal disease, strictured, communication with the duct was present. Percutaneous drainage was possible but prolonged. Surgical drainage was successful in these patients.

Group III: chronic pseudo cyst with grossly diseased duct, strictured and pseudo cyst communication was present. Surgical procedure addressing the duct pathology was ideal.

Nealon and Walser classification: [8]

This classification is based on the pancreatic ductal anatomy.

Type I: Normal duct without communication to the cyst.

Type II: Normal duct with communication to the duct.

Type III: Normal duct with stricture and there is no duct to cyst communication.

Type IV: Normal duct with stricture and with duct to cyst communication.

Type V: Normal duct with complete cut-off from the cyst.

Type VI: chronic pancreatitis with no duct to cyst communication.

Type VII: chronic pancreatitis with duct to cyst communicate

EMBRYOLOGICAL DEVELOPMENT

NORMAL DEVELOPMENT [9, 10, 14]

The dorsal and ventral primordia develop into pancreas. By the end of fourth week, the dorsal primordium arises from the future dorsal side of the duodenum. The ventral primordium arises on the 32nd day from the base of the hepatic diverticulum near the bile duct. They fuse by the end of the sixth week.

Main pancreatic duct develops from the distal portion of dorsal pancreatic duct while the proximal part of the duct forms the duct of santorini. The ventral pancreas develops into the duct of Wirsung and part

of the uncinate process and head. The dorsal pancreas forms the remainder of the uncinate process and head, plus the body and tail. The secretory acini appear by the third month, and the islands of Langerhans arise from the acini approximately at the end of the third month. Insulin secretion begins around 5th month.

Congenital Anomalies

1. Pancreas Divisum

This is due to the failure of fusion of the dorsal and ventral pancreatic primordia. It results in independent draining of the ducts of Wirsung and Santorini. This condition is also called as isolated ventral pancreas. Incidence is 12%, and may cause acute or chronic pancreatitis and rarely pancreatic carcinoma.

2. Annular Pancreas

Pancreas may be partially or wholly separated from the duodenum, or the duodenal muscularis may be penetrated by the pancreatic tissue. A ring of pancreatic tissue which contains a large duct usually enters the main pancreatic duct. It sometimes may enter the duodenum independently. Rarely, at the level of the pancreatic ring duodenal stenosis may occur.

3. Pancreatic Gallbladder

It is the presence of pancreatic tissue in the wall of an otherwise normal gallbladder. It does not indicate origin from the ventral pancreatic primordium.

4. Heterotrophic Pancreatic Tissue, Ectopic Pancreas, and Accessory Pancreas.

Most commonly found in the wall of the duodenum or ileum, stomach, Meckel's diverticulum, or at the umbilicus. Colon, appendix, gallbladder, omentum or mesentery, and in anomalous bronchoesophageal fistula are the less common sites.

5. Intraperitoneal Pancreas.

MOLECULAR REGULATION OF PANCREATIC DEVELOPMENT

Fibroblast growth factor (FGF) and activin (a TGF-β family member) were produced by notochord which repress SHH expression in gut endoderm destined to form pancreas. It up regulates the expression of the pancreatic and duodenal homeobox 1 (PDX) gene. This is the master gene for pancreatic development. All of the downstream effectors of pancreas development have not been determined. But expression of the

paired homeobox genes PAX4 and 6, specify the endocrine cell type, such that cells possessing both genes become β (insulin),D (somatostatin), and γ (pancreatic polypeptide) cells; whereas those expressing only PAX6 become α (glucagon) cells.

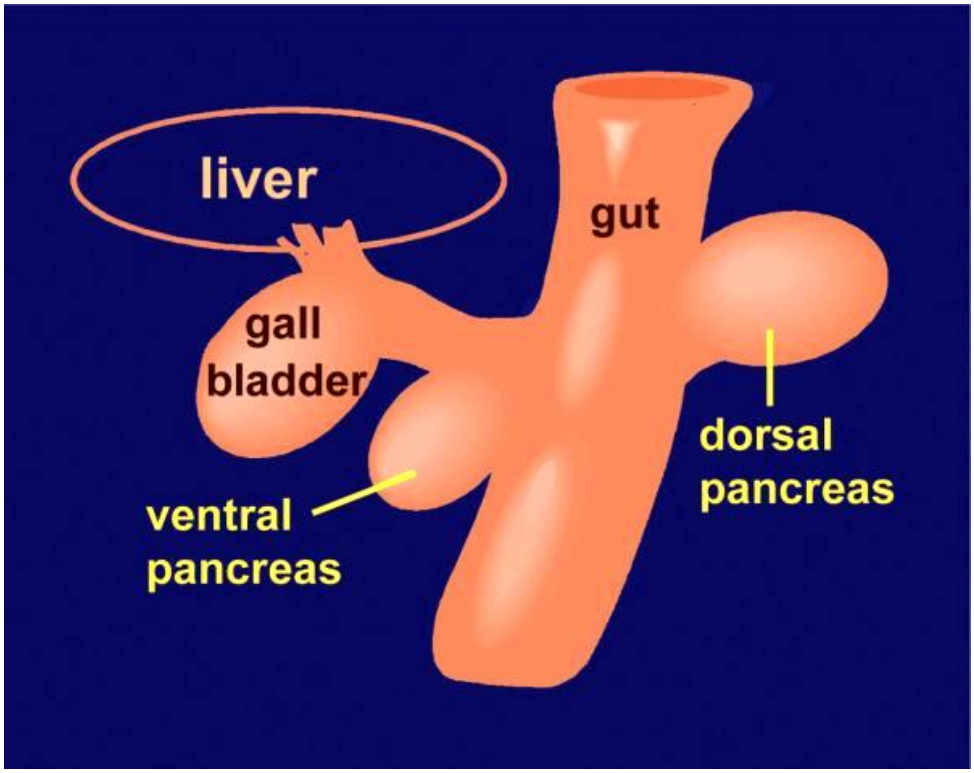


Fig-1: Early development of the pancreatic primordia

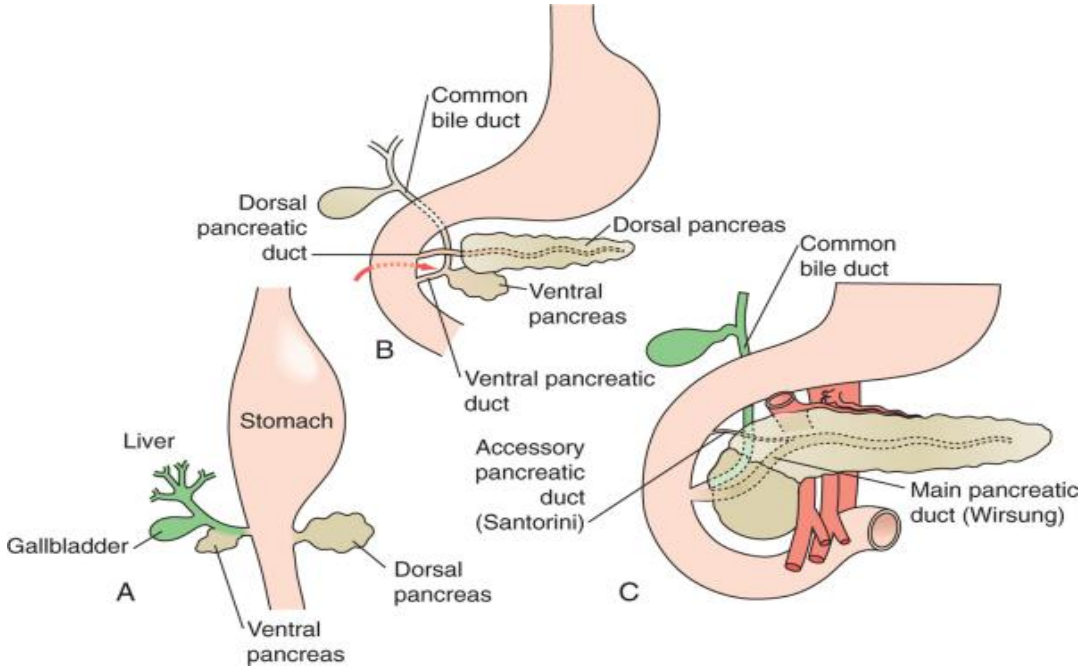


Fig-2: Development of pancreas

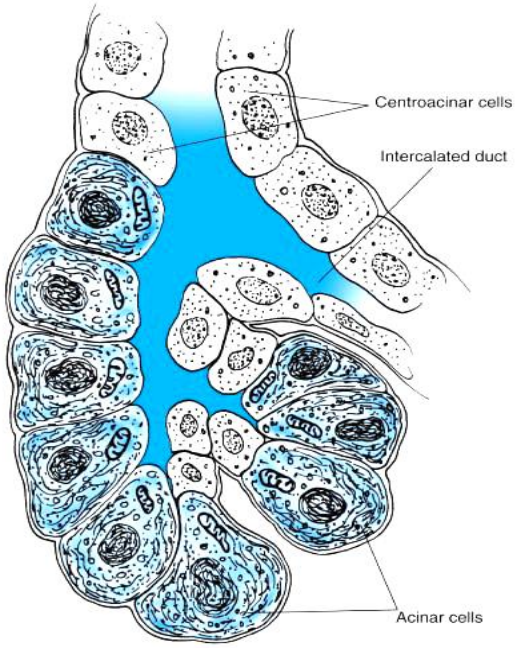


Fig-3: Histology of pancreas

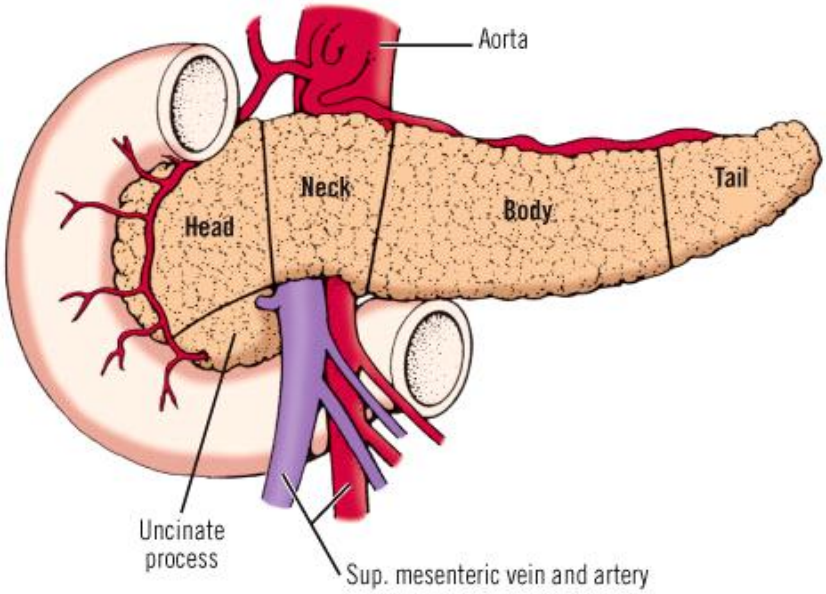


Fig-4: parts of pancreas

SURGICAL ANATOMY [9, 11, 14]

Pancreas is the largest digestive gland in our body. It performs both exocrine and endocrine functions. Major part is exocrine secretes wide range of enzymes involved in digestion. It is responsible for the glucose homeostasis and in the control of upper gastrointestinal motility and function.

The pancreas is salmon pink in colour. It is firm in consistency with lobulated surface.

The pancreas is divided into head, neck, body and tail and also posses one accessory lobe called uncinate process.

In adults it measures 12 to 15 cms long. It has a flattened tongue shape with thicker at its medial end (head) and thinner towards the lateral end.

Head

The head of the pancreas is flattened and has an anterior and posterior surface. The pylorus and the transverse colon lies adjacent to the anterior surface while the posterior surface lies in relation to the right kidney and its vessels and the inferior vena cava, the right crus of the diaphragm, and the right gonadal vein. The head found to be adhered to the duodenal loop.

Uncinate Process

It is a ‘hook-like’ projection from the head of the pancreas and is highly variable in size and shape. It is directed downwards and slightly to the left from the head.

Neck

It is about 1.5 to 2.0 cm long and partially covered by pylorus in its anterior surface. The portal vein is formed by the confluence of the superior mesenteric and splenic vein behind the neck.

Body

Its anterior surface is covered by the two layers of peritoneum of the omental bursa separating the stomach from the pancreas. From the body there is a blunt upward projection called the omental tuberosity (tuber omentale) that contacts the lesser curvature of the stomach at the attachment of the lesser omentum where it is related to the transverse mesocolon. The peritoneum divides into two leaves and covers the anterior and posterior surface respectively. The middle colic artery lies in between the leaves of the transverse mesocolon.

The body of the pancreas is related posteriorly to the origin of the superior mesenteric artery, the aorta, the left crus of the diaphragm, the splenic vein, the left kidney, left renal vessels, the left adrenal gland.

Tail

It is mobile and reaches the hilum of the spleen in 50 percent of cases. Splenic artery, the origin of the splenic vein and the tail of pancreas is contained between the two layers of the splenorenal ligament. The outermost layer of this ligament is the posterior layer of the gastrosplenic ligament which contains short gastric vessels hence, careless division of this ligament may injure the short gastric vessels.

Anterior relations

Transverse colon, transverse mesocolon, lesser sac and the stomach are the anterior relations of the pancreas.

Posterior relations

Bile duct, splenic and portal vein, inferior venacava, aorta, left psoas muscle, left kidney and the hilum of the spleen are the posterior relations of the pancreas.

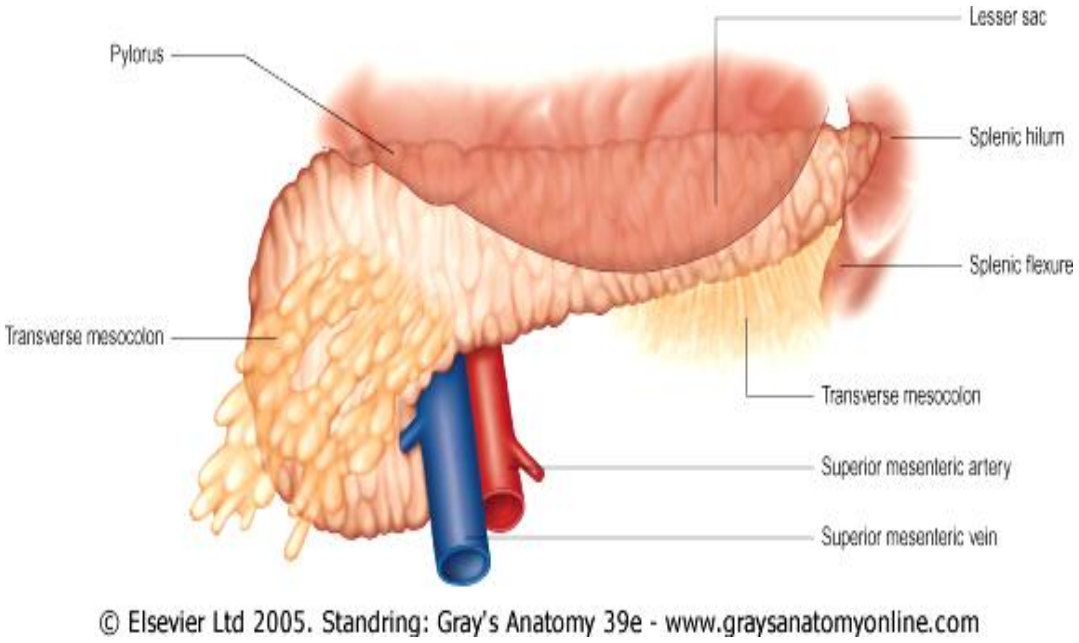


Fig-5: anterior relations of pancreas

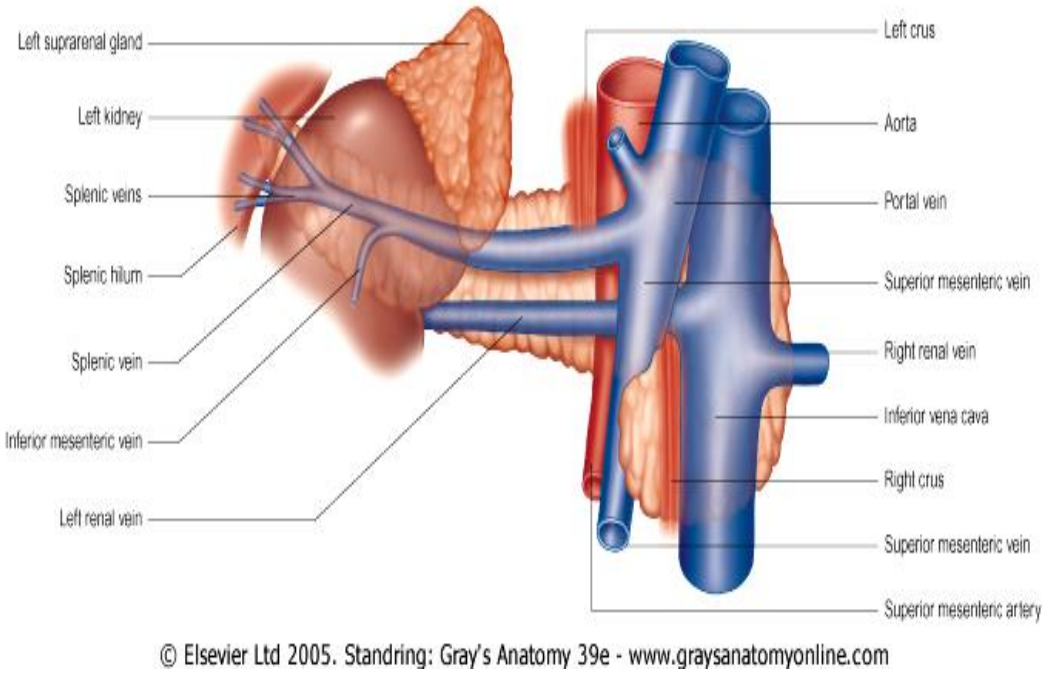


Fig-6: posterior relations of pancreas

Ductal system of pancreas

The main pancreatic duct

It starts at the tail end of the pancreas and travels through the tail and body of the pancreas midway between the superior and inferior margins, slightly more posterior than anterior.

From the tail and body of the pancreas about 15 to 20 short tributaries enters the duct at right angles; with superior and inferior tributaries alternates. The main duct may also receive a tributary draining the uncinate process. In some individuals, the accessory pancreatic duct empties into the main duct. There are some small tributary ducts in the head may open directly into the intrapancreatic portion of the common bile duct. On reaching the head of the pancreas, the main duct turns caudal and posterior and near the major papilla it turns horizontally and join the caudal surface of the CBD and at the level of second lumbar vertebra it enters the wall of the duodenum.

Accessory pancreatic duct (of Santorini)

It drains the anterosuperior part of the head. It may enter the duodenum at the minor papilla or drain directly into the main pancreatic duct. It is smaller than the main pancreatic duct.

Papilla of Vater and Ampulla of Vater

It is also called the major duodenal papilla, is a nipple like formation and projection of the duodenal mucosa via which the distal end of the ampulla of Vater passes into the duodenum. The ampulla of Vater (hepatopancreatic) is the union of the pancreaticobiliary ducts.

Major Duodenal Papilla

It is located on the dorsomedial wall of the second portion of the duodenum, 7 to 10 cm from the pylorus. Rarely, may it be in the third portion of the duodenum. On endoscopy, it has been found to lie to the right of the vertebral column at the level of the second lumbar vertebra. The papilla is identified, where a longitudinal mucosal fold or frenulum meets a transverse mucosal fold to form a ‘T’. No such arrangement marks the site of the minor papilla.

Ampulla (of Vater)

It is the dilatation of the common pancreaticobiliary channel adjacent to the major duodenal papilla and below the junction of the two ducts. The ampulla will not exist if a septum extends as far as the duodenal orifice.

The sphincter of oddi

It has a complex multisphinteric mechanism and is made up of 4 sphincters. They are

1) Superior choledochal sphincter

2) Inferior choledochal sphincter

3) Ampullary sphincter

4) Pancreatic sphincter

Ampulla Classification

Type 1: The pancreatic duct opens into the CBD at a variable distance from the opening in the major duodenal papilla. The common channel may or may not be dilated (85 percent).

Type 2: The pancreatic and bile ducts open near one another, but separately, on the major duodenal papilla (5 percent).

Type 3: Both ducts open into the duodenum at separate points (9 percent).

Minor Duodenal Papilla

It is located nearly 2 cm proximal and slightly anterior to the major papilla. It is smaller and its site lacks the characteristic mucosal folds like that of the major papilla. An excellent landmark for locating the minor papilla is the gastroduodenal artery, which is situated anterior to the accessory pancreatic duct and the minor papilla. Its opening is guarded by the sphincter of Helly.

HISTOLOGY AND PHYSIOLOGY

Pancreas consists of exocrine and endocrine units. Acini and islets of Langerhans form the functional unit respectively. Acini are pyramidal in shape and are arranged in rounded structures. The acinar and duct system secretes about 1 liter of digestive fluid rich in enzymes, sodium and bicarbonates.

The islets of Langerhans are distributed throughout the pancreas and consist of 75% ‘b’ cells producing insulin, 20% ‘a’ cells producing glucagon and 5% ‘d’cells producing somatostatin.

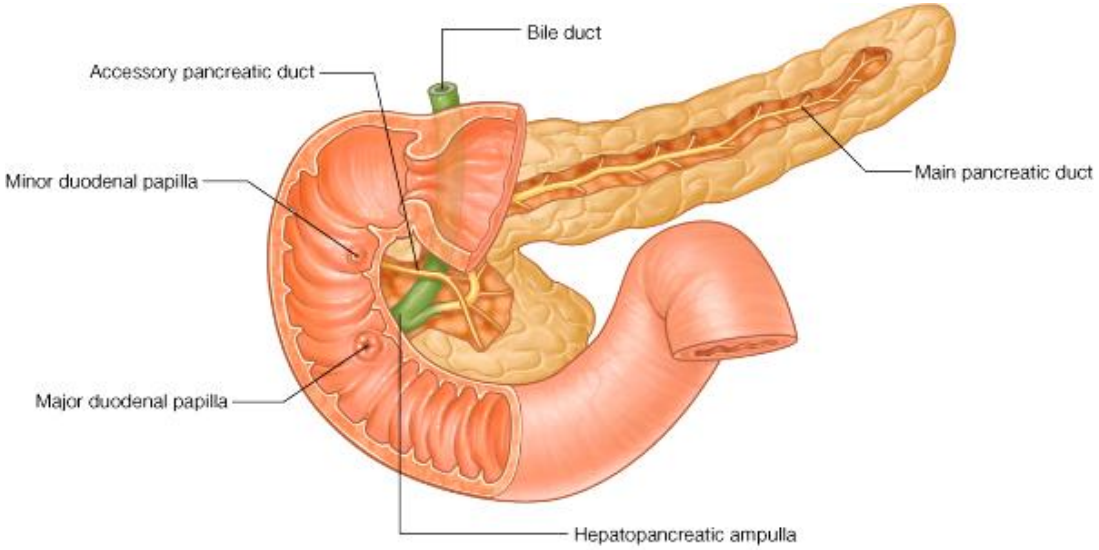


Fig-7: Ductal system of pancreas

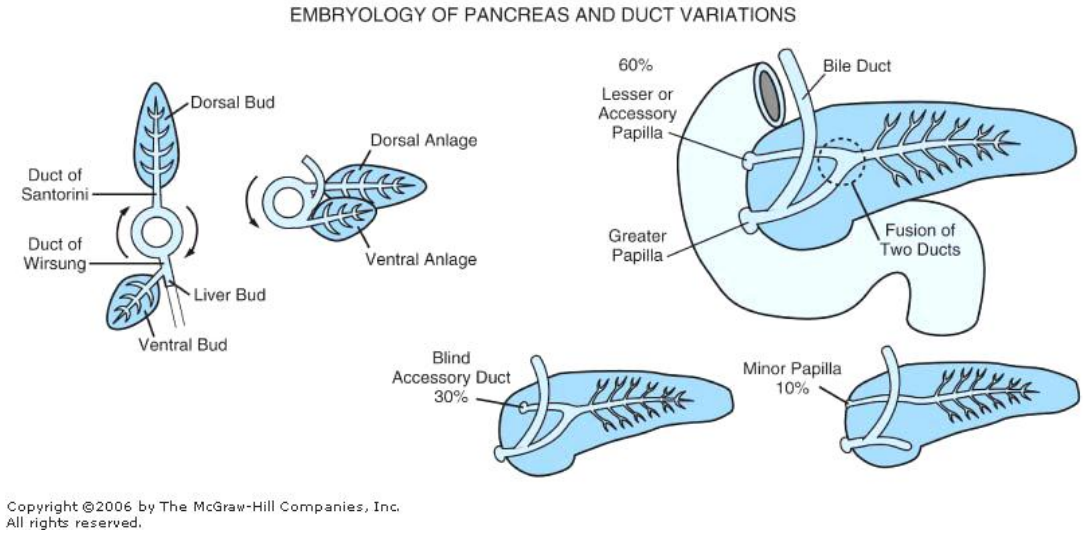


Fig-8: Ductal variations

BLOOD SUPPLY [9, 14]

Arterial supply

Superior pancreaticoduodenal artery, inferior pancreaticoduodenal artery and splenic artery supplies the pancreas.

Venous drainage

Splenic vein, portal vein, superior and inferior mesenteric veins drains the pancreas.

Lymphatic Drainage

Lymphatic drainage is centrifugal to the surrounding nodes. These lymphatics drain into 5 major collecting trunks and 5 lymph node groups: anterior, posterior, superior, inferior and splenic group of nodes. But all of them drain into celiac and superior mesenteric nodes.

Nerve Supply (“Pancreatic nerve" of Holst)

Sympathetic nerve supply is via the splanchnic nerves and the parasympathetic supply via the vagus nerve. These nerves generally follow blood vessels to their destinations.

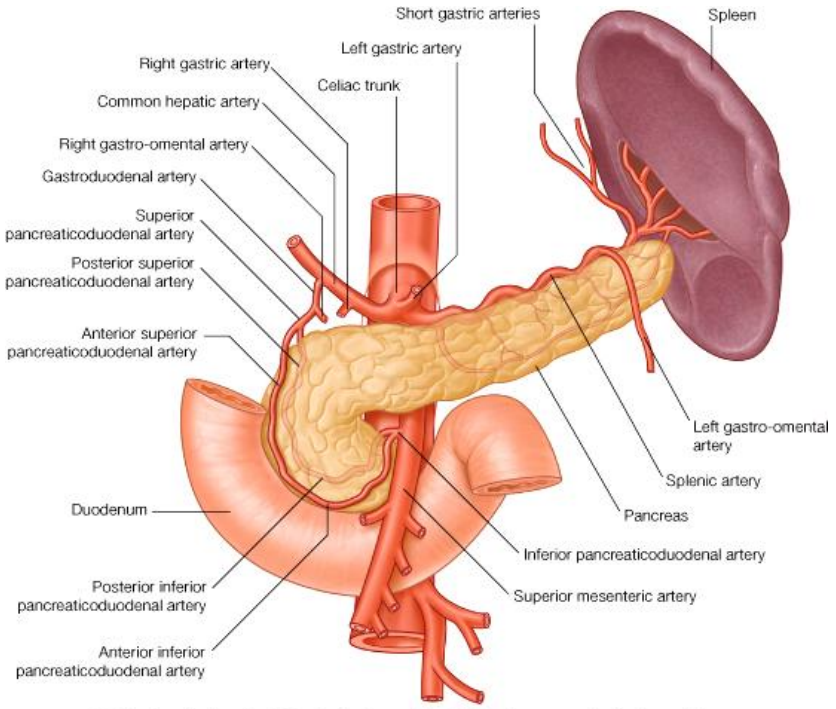


Fig-9: Arteries of pancreas

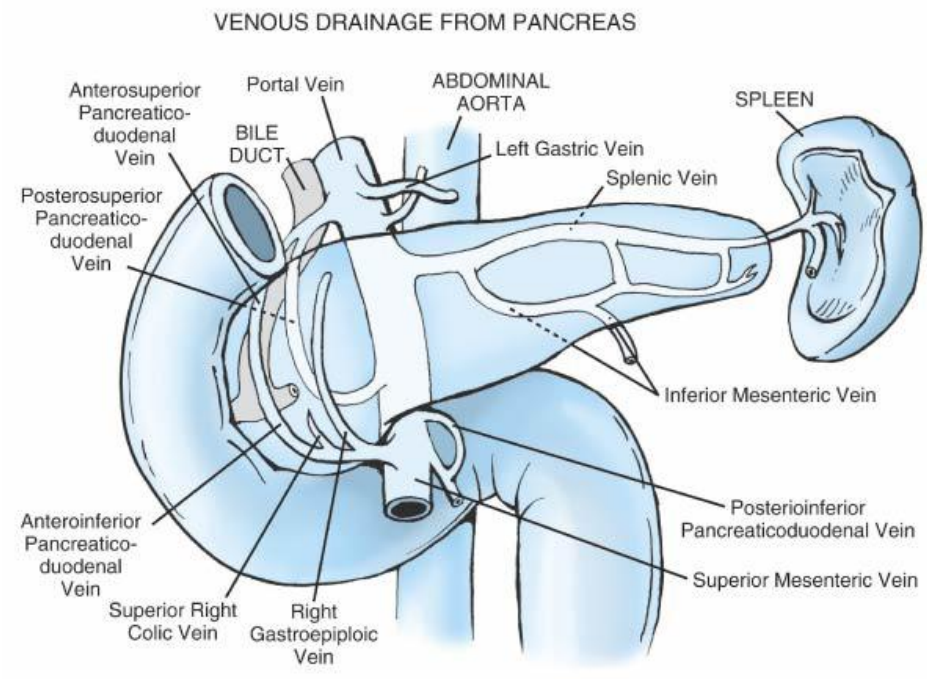


Fig -10: Venous drainage of pancreas

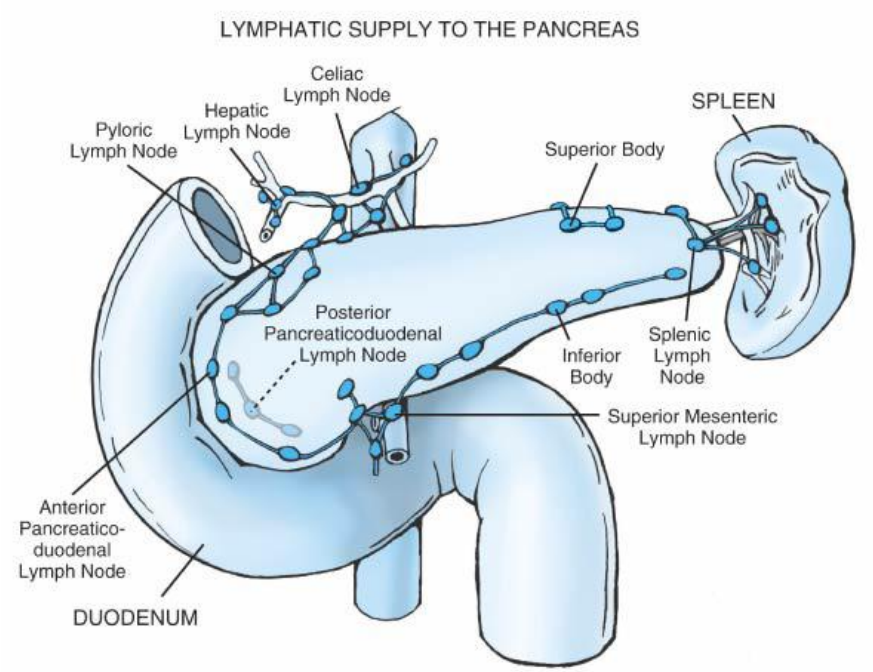


Fig-11: Lymphatic drainage of pancreas

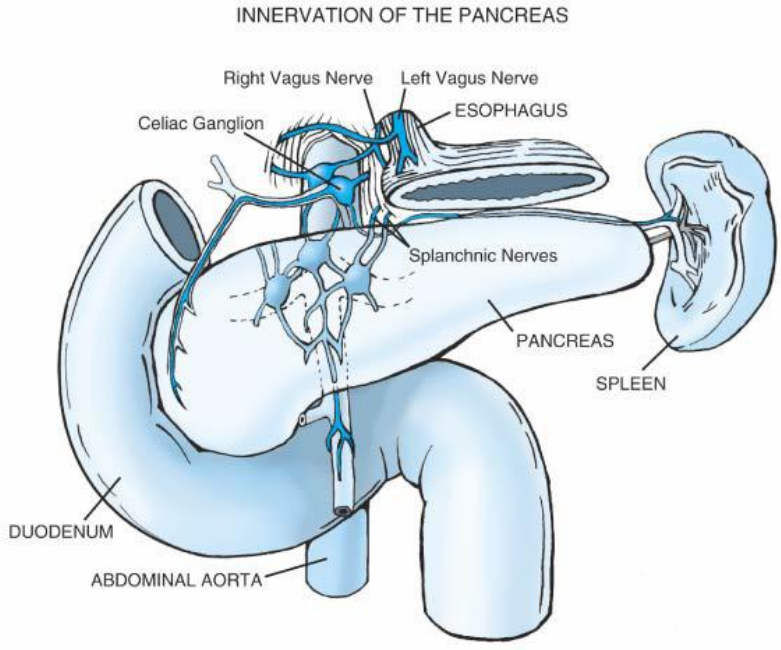


Fig-12: Nerve supply of pancreas

PSEUDOCYST OF PANCREAS [10, 11, 12, 13]

Focal collection of pancreatic secretions surrounded by a wall of fibrous and or granulation tissue is called as pseudo cyst of pancreas. It arises as a result of acute or chronic pancreatitis, pancreatic trauma, or obstruction of pancreatic duct by a neoplasm. Pseudocysts account for 50% and 75% of cystic lesions arising from the pancreas. They are unique from other peripancreatic fluid collections (cystic neoplasm and congenital, parasitic, and extra pancreatic cysts). They lack an epithelial lining. There is absence of high concentration of pancreatic enzymes within the cyst. It takes about 4 weeks to form a cyst after an episode of pancreatitis or pancreatic trauma.

Pseudocysts are formed as a result of local response to the extravasated pancreatic secretions and are walled off by the surrounding structures. The capsule of the pseudo cyst is thin fibrous tissue initially which can progressively thicken as the pseudocyst matures. The fluid contents of the pseudocyst are slowly resorbed by the body and the pseudocyst resolves, indicating that the communication between the pseudocyst and the pancreatic duct has closed. But Persistence of an ongoing communication results in large size and maturation.

The incidence of pseudocysts in acute pancreatitis ranges from 5% to 16% whereas in chronic pancreatitis the rates are higher and the incidence was 20–40%.

TERMINOLOGY

Acute fluid collections [21]

It occurs early in the course of acute pancreatitis and it lacks a discrete wall of fibrous or granulation tissue. They are common in patients with severe pancreatitis and occur in 30% to 50% of cases. The majority of these lesions regress spontaneously without any specific therapy. Acute fluid collections are not always due to communication with the pancreatic duct but mostly a serous or exudative reaction to pancreatic inflammation or trauma. They lack true communication with the duct of pancreas hence acute fluid collections are also referred to as pseudopseudocysts.

Early pancreatic (sterile) necrosis

It is a localized or diffuse area of nonviable parenchyma of the pancreas, usually occupying >30% of the gland. It contains liquefied debris and fluid.

Late pancreatic (sterile) necrosis

It has a well formed wall and contains organized sterile necrotic debris and fluid. It confined to the pancreas.

Pancreatic abscess

Collection of purulent infected fluid that posses little or no necrotic material and arises as a complication of acute pancreatitis or trauma is called as pancreatic abscess. It typically occurs late in the course of severe acute pancreatitis. It usually occur 4 or more weeks after the onset of symptoms and the patients will have signs and symptoms of infection. The presence of purulent exudates, a positive bacterial or fungal growth in culture with or without necrotic pancreatic material differentiates a pancreatic abscess from infected pancreatic necrosis.

Acute pancreatitis

Essentials of Diagnosis

- Abrupt onset of epigastric pain, frequently with back pain.
- Nausea and vomiting.
- Elevated serum or urinary amylase.
- Cholelithiasis or alcoholism (many patients).

Reversible inflammatory disease of the pancreas that is associated with little or no fibrosis of the gland is called acute pancreatitis.

Septicemia, shock, failure of respiratory and renal system is the common complications mainly responsible for considerable morbidity and mortality during the acute episode. Balance between the pro- and anti-inflammatory factors determines the severity of pancreatitis and associated lung injury. Amylase, lipase, trypsinogen and elastase are the markers most commonly elevated in acute pancreatitis among which serum lipase is specific.

Mild Pancreatitis

Criteria

- No systemic complications,
- Low APACHE-II scores and Ranson's signs,
- Sustained clinical improvement,
- CT scan rules out necrotizing pancreatitis.

The treatment for mild pancreatitis is mostly supportive.

Severe pancreatitis

Criteria

- High APACHE-II scores and Ranson's signs,
- Onset of encephalopathy,

- Hematocrit >50%,
- Urine output <50 mL/h,
- Hypotension,
- Fever or peritonitis

The most serious complication of acute pancreatitis is infection. This is due to the translocation of enteric bacteria and is seen commonly in necrotizing rather than interstitial pancreatitis. It is the most common cause of death in acute pancreatitis.

Chronic Pancreatitis

Essentials of Diagnosis

- Persistent or recurrent abdominal pain,
- Pancreatic calcification on x-ray in 50%,
- Pancreatic insufficiency in 30%; malabsorption and diabetes mellitus,
- Most often due to alcoholism.

Types

- Chronic Calcifying (Lithogenic) Pancreatitis
- Chronic Obstructive Pancreatitis
- Chronic Inflammatory Pancreatitis

- Tropical (Nutritional) Pancreatitis
- Hereditary Pancreatitis
- Asymptomatic Pancreatic Fibrosis
- Idiopathic Pancreatitis

Acute pseudo cyst

It is the collection of pancreatic juice, occurs as a complication of acute pancreatitis and is walled off by the early granulation tissue within 3- 4 weeks of an acute episode.

Chronic pseudo cyst

Pseudo cyst persisting for more than 6 weeks and is surrounded by normal granulation and fibrous tissue is called as chronic pseudo cyst.

Incidence [36, 37]

It is low, 1.6%, or 0.5-1 per 100000 adults per year. Pseudocyst found to be more in chronic pancreatitis than acute pancreatitis. According to the literature incidence was 30%to 40%, but the exact value is not well documented due to the lack of definitive data on the long term follow up of patients with chronic pancreatitis.

NATURAL HISTORY [22]

Initially determination of the natural history of pancreatic pseudocysts relied on diagnostic modalities with less accuracy like physical examination, upper gastrointestinal series, and operative and autopsy findings before the widespread use of ultrasonography and CT. Based on these data we thought that spontaneous regression of pseudo cyst was rare and complications that too occur in up to half of all patients. Hence nonoperative, conservative therapy was not adopted in patients with known pancreatic pseudocysts previously.

But series of studies based on improved imaging techniques increased our understanding of the natural history of pancreatic pseudocysts that led us to the era of nonoperative management in majority of these lesions.

Pseudocysts present for less than 6 weeks were found to resolve spontaneously in 40% of cases, although they had a 20% risk for complications. But cysts which present for longer than 12 weeks did not resolve spontaneously and were associated with a complication rate of 67%. Pseudocysts measuring more than 6 cm required operative intervention, whereas 40% of patients with pseudocysts 6 cm or smaller also required surgical treatment. But 27% of the patients with

pseudocysts measuring larger than 10 cm were successfully managed nonoperatively.

These data suggested that many patients with pancreatic pseudocysts can be managed nonoperatively with careful clinical and radiological follow up.

The experience of the large centers and others has led to the practice of initial nonoperative management in the majority of patients with pancreatic pseudocysts. According to these data, more than 50% of patients can be treated without much intervention. Patients with a stable or decreasing cyst and who do not develop symptoms referable to the pseudo cyst and related complications can be treated conservatively. In all other Patients who do not meet any of these criteria at follow-up should undergo appropriate intervention (surgical, endoscopic, or percutaneous).

Balthazar and Ranson Grading Scale of Pancreatitis[13]

A Normal pancreas

B Focal or diffuse enlargement

C Mild peripancreatic inflammatory changes

D Single fluid collection

E Two or more fluid collections or gas within the pancreas or within peripancreatic inflammation

PATHOPHYSIOLOGY

Pancreas responds to inflammation and trauma in the form of self destruction with focal necrosis and hemorrhage in the parenchyma due to pancreatic acinar damage. This leads to the escape of the enzymes trypsinogen and lipase.

The pathway by which pseudo cysts are formed often follows a progression which includes diffuse Peripancreatic effusion, pancreatic necrosis, liquefaction, phlegmon, acute pseudo cyst and finally encapsulation or maturation.

Cyst arising in setting of chronic pancreatitis mostly occurs without an antecedent flare of acute pancreatitis referred as chronic pseudo cyst and generally has a mature wall on presentation. Here the duct ruptures owing to inspissated duct. Chronic pseudo cyst usually located within the substance of the gland due to the firm and fibrotic nature pancreatic parenchyma.

Positions of pseudo cyst

According to the recent series the most common positions were in the gastro colic omentum, gastro hepatic omentum, gastrosplenic ligament and in the retrogastric region.

Acute pseudocysts usually resolve spontaneously over a course of 6 weeks or longer in up to 50% of cases. But pseudocysts of >6 cm resolve less frequently than smaller one. It may regress over a period of weeks to months. Pseudocysts are multiple in 17% of patients, or may be multilobulated. Pseudo cyst may occur intrapancreatically or extend beyond the region of the pancreas into other cavities.

ETIOLOGY [4, 10, 11, 12]

Alcohol (65%)

Acute pancreatitis (10%to 20%)

Chronic pancreatitis (20% to 40%)

Gallstones (15%)

Trauma (5% to 10%)

Others

CLINICAL FEATURES

Pseudocysts are more common in males than in females and 45% to 50% of them occur in or around the head of the pancreas, while the

remainder are evenly distributed along the neck, body and tail and sometimes may have multiple pseudocysts.

Symptoms

Patients most commonly present with symptom of abdominal pain and it present in up to 90% of patients. Nausea and vomiting (50% to 70%), early satiety, weight loss (20% to 50%), jaundice (10%), and low-grade fever (10%) are the other less common symptoms.

Signs

Upper abdominal tenderness, abdominal mass, abdominal distension are the clinical signs most commonly noted in pseudo cyst of pancreas. Uncommon clinical presentations of pseudo cyst:

1. Jaundice, pruritus secondary to common bile duct obstruction.
2. Varicel bleeding due to splenic or portal vein thrombosis.
3. Sepsis secondary to pseudo cyst infection.
4. Intra abdominal haemorrhage secondary to bleeding from ruptured pseudo aneurysm in adjacent vessels.

DIAGNOSIS [9, 24, 25]

Elevated serum amylase and lipase

Persistently elevated amylase even after resolution of acute pancreatitis should prompt investigation for a pseudocyst.

Mild leukocytosis

Elevated liver function test

Ultrasounds scan

It is 90% accurate and 98% specific in diagnosing pancreas. Pancreas may be obscured by bowel gas in 1/3rd of patients.

CT scan

It provides additional information like relationship with the adjacent structures, lumen available for enteric drainage and any retroperitoneal extension.

Magnetic resonance imaging (MRI)

Helps in predicting whether the cyst contains solid debris or not which tends to prevent adequate percutaneous drainage.

Magnetic resonance cholangiopancreatography (MRCP) [30]

It defines the pancreatic ductal anatomy.

Magnetic resonance pancreatography

It is useful in the evaluation of ductal strictures and filling defects.

Percutaneous aspiration

Pseudo cyst fluid is analyzed for viscosity, amylase content, cytology, CEA, ca-125 to differentiate it from other cysts of pancreas.

ERCP

It is used to demonstrate abnormalities of pancreatic duct in upto 90% of the cases with pseudo cyst. ERCP is indicated in jaundiced patients to differentiate between common bile duct compression by the cyst and the ductal stricture. It is used to identify the candidates for percutaneous drainage among patients with pseudo cyst.

Barium meal

It is used when patients present with compressive symptoms especially of stomach.

Angiography [23]

It is used to identify the patients who have had bleeding complications from pseudo cyst or those who have portal hypertension. It can be used to control Bleeding from the cyst.

Endoscopic ultrasound

It is used to distinguish pancreatic pseudocyst from other cystic neoplasm of the pancreas.

Differential diagnosis

1. Pancreatic abscess
2. Cystic diseases of the pancreas
3. Malignancy of pancreas
4. Pancreatic artery aneurysm

Certain pancreatic tumors present in cystic form with the majority being malignant or having malignant potential. The most common of these are serous cystadenoma, mucinous cystic neoplasm; intraductal papillary mucinous tumors and solid pseudo papillary tumors. Inadvertent drainage of this cystic tumor will lead to tumor dissemination. So it is mandatory to ascertain the nature of the cyst before embarking on treatment.

Presence of internal dependent debris appears to be highly specific MR finding for the diagnosis of pseudo cyst.

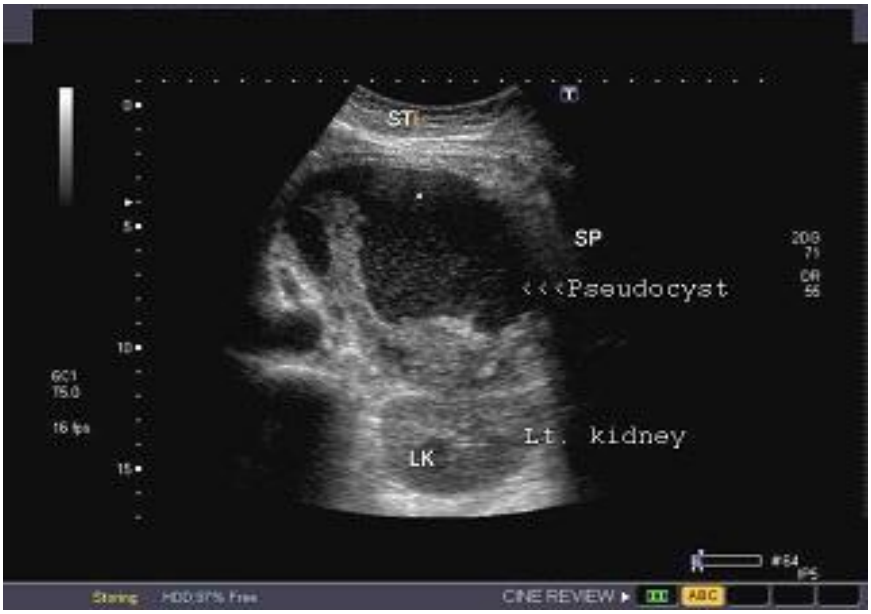


Fig-13: USG image of pancreatic pseudocyst

Fig-14: CT Image of pseudo cyst of pancreas

MANAGEMENT [10, 11, 12, 13, 16]

Intervention is indicated in those patients who do not fulfill the criteria for conservative, nonoperative management. In all these patients the associated conditions, such as disruption of the duct, obstruction of bile duct, and chronic pancreatitis should be treated simultaneously.

Management options for pseudocyst

Observation

Percutaneous aspiration or drainage

Endoscopic aspiration or drainage

Transpapillary endoscopic drainage or stenting

Operative approaches (open or laparoscopic)

- Internal drainage
- External drainage
- Resection

Treatment of patients with pseudo cyst is depends on the presence or absence of symptoms, the clinical setting, age of the patient, size of the cyst and the presence or absence of complications.

Supportive medical care

Initially patients were treated with routine intravenous fluids, analgesics and antiemetic. Diet low in fat can be given if the patient tolerates oral fluids. Ryle's tube feeding or total parenteral nutrition (TPN) can be given to patients not tolerating orally. Octreotide can be used in pancreatic pseudocyst as it will decrease pancreatic secretions and aid in pseudocyst resolution. Unfortunately, this strategy has not been rigorously tested.[35]

Timing of the drainage:

Alcoholic pancreatitis induced acute pseudo cyst to be observed for 4 to 6 weeks with regular follow up with USG. After 6 weeks if the cyst is regressing and the patient is asymptomatic can continue the conservative management.

Definitive treatment is indicated if the patient is symptomatic and the cyst is <6cm with a mature wall.

Therapy is also indicated in Symptomatic patient, or if the cyst is increasing in size, infected cyst or there is suspicion of malignancy.

Asymptomatic pseudo cyst can be safely observed regardless of size and duration of the cyst. Intervention is mandatory only in the presence of symptoms, complications or increase in size.

Percutaneous aspiration [20, 21, 31]

Pseudocyst fluid is aspirated in one sitting without leaving an indwelling drainage catheter. Less than 50% of patients will have complete resolution and the remaining patients may require repeat aspiration or a second technique (endoscopic or operative drainage). Pseudocysts located in the tail of the pancreas, volume less than100 ml and low intracystic amylase levels are the predicting factors for the successful management of pseudo cyst by percutaneous aspiration.

Percutaneous catheter drainage [18, 21]

An indwelling catheter is placed into a pseudocyst by the Seldinger technique under ultrasound or CT guidance. The cyst is normally entered via flank or via transgastric approach. Then the tract is gradually dilated to accept a catheter ranging in size from 7 to 14 French (7F to 14F).The patency is maintained by typical irrigation with a small amount of saline two to three times in a day, and they are attached to a bag to drain by gravity.

Contraindications

Nonavailability of a safe approach route, pancreatic necrosis, pseudocyst hemorrhage and complete obstruction of the main pancreatic duct are the contraindications for percutaneous catheter drainage.

Complications

Infection of the drain tract, persistent or recurrent pseudo cyst, pancreatico-cutaneous fistula is the major complications.

Endoscopic approaches [33, 36]

Guidelines for Endoscopic Drainage

1. Well-developed cyst wall
2. Nonacute pseudocyst
3. Noninfected pseudocyst
4. Pancreatic ductal disruption or stricture
5. Pseudocyst wall <1 cm
6. Pseudocyst indenting gastrointestinal tract versus endoscopic ultrasonography location of cyst

It uses a flexible upper endoscopy to localize and drain pseudocysts by creating a fistulous tract between the pseudocyst and the stomach or duodenum. This communication is created by an electrocautery and the fistulous opening is stented with an endoprosthesis. Endoscopic drainage is possible only for the pseudocyst located in the head or body of the pancreas and be well apposed to and bulging into the intestinal lumen. Endoscopic ultrasound (EUS) can be used to visualize the pseudocyst and

to choose a site for drainage. Hemorrhage from the gastric or duodenal wall and free perforation are the risks associated with this procedure. Endoscopic and percutaneous techniques can be used in combination to localize and drain pseudocysts that are adjacent to the gastric wall that do not bulge into the lumen.

Transmural endoscopic drainage

Its success rate is comparatively favorable with that of percutaneous and operative drainage.

Endoscopic cystoduodenostomy

It is little more effective than cystogastrostomy and the recurrences were very few. It is mainly due to the longer patency rates of cystoduodenostomy and the smaller size of the pseudocysts. Complications of both routes were extremely uncommon, but significant bleeding, infection or perforation occurs in less than 2% of cases. Factors associated with successful endoscopic transmural drainage include location in the head and body of the pancreas, wall thickness of <1 cm, and pseudocyst secondary to chronic pancreatitis or trauma.

Pseudocysts occur in severe necrotizing pancreatitis do not respond well to endoscopic drainage because solid debris obstructs the endoprosthesis. Transampullary (transpapillary) drainage [33] has been

attempted in selected patients with pseudocyst shown to have an obvious communication with the main pancreatic duct by ERCP and in possible patients stents are also placed into the lumen of the pseudocyst through the ampulla, along the pancreatic duct. If it is not possible the tip of the stent can be placed as close as possible to the communication between the pancreatic duct and the pseudocyst; one must take care to cross any intervening strictures of the pancreatic duct.

Complications are rare and have included mild post procedure pancreatitis, bleeding and abscess formation secondary to stent obstruction.

For pseudocyst that develop in atypical locations (mediastinal, intrahepatic, intrasplenic, pelvic) endoscopic transpapillary nasopancreatic drain placement will be useful. It is done in patients with partial disruption of the pancreatic duct, which was successfully stented with resolution of the pseudo cysts in 91% of patients.

Operative intervention [4, 10, 11, 12, 13, 26, 32]

Percutaneous drainage can be useful in managing the duct anomalies types I and II with expected high rates of resolution. But surgical or endoscopic internal drainage or surgical resection is indicated

in types V to VII because of the complicated duct strictures and stones associated with these variants of chronic pancreatitis.

TABLE- 1: INDICATIONS FOR OPERATIVE INTERVENTION

Sl. no	External drainage	Internal drainage	Pancreatic resection
1	gross infection	Pancreatic duct stricture or leak	cyst in the body and tail, possible malignancy
2	free rupture	benign cyst	complex cystic disease of head
3	immature cyst wall	mature cyst(>1cm)	pancreatic pseudoaneurysm
4	unstable patients		

Both modalities can be used in Types III and IV. However, percutaneous drainage alone may be associated with higher rates of recurrence because of the underlying duct strictures.

Surgical salvage procedure

Uncomplicated pseudocyst requiring surgical intervention is managed with internal drainage;

The surgical options available;

Cystojejunostomy to a Roux-en-Y jejunal limb

Cystogastrostomy

Cystoduodenostomy

Guidelines for Open Surgical Intervention

1. Cyst rupture or hemorrhage, or cyst adjacent to vascular structures
2. Cysts with the potential to be cystic neoplasm
3. Patients with multiple or infected pseudocysts
4. Cysts with an associated high-grade pancreatic duct stricture
5. Cyst wall >1 cm
6. Pancreatic pseudoaneurysm

Cystojejunostomy

It is ideal when the pseudocyst is located at the base of the transverse mesocolon and is not adherent to the posterior gastric wall.

Cystogastrostomy

It is simple, quicker and less technically challenging procedure and is used when the pseudocyst is adherent to the posterior gastric wall.

Cystoduodenostomy

Pseudocysts located in the pancreatic head or uncinate process that lies within 1 cm of the duodenal lumen can be managed with this technique. It is performed in a fashion similar to that of cystogastrostomy. Duodenal leak and subsequent fistula formation are the known complications of this procedure hence, cystoduodenostomy is least attractive method of internal drainage than cystogastrostomy and it is reserved for rare use.

Cystogastrostomy and cystojejunostomy have comparable morbidity, mortality and recurrence rates. Operative mortality in some series ranges from 0% to 5%. Cystojejunostomy has a slightly lower recurrence rate (7% vs. 10%) but is associated with significantly more blood loss and operative time.

Laparoscopic drainage procedures

It is used to drain large retrogastric pseudo cysts. It allows for biopsy of the cyst wall as well as for cyst debridement. Cystojejunostomy can also be performed laparoscopically in select patients for better dependent drainage.

Natural Orifice Transluminal Endoscopic Surgery (NOTES)

Cystogastrostomy

It is used in mature pseudo cysts (8 to 23 cm in diameter) and for debridement of infected pancreatic necrosis. Development of advanced endoscopic tools and advances in NOTES techniques open the way to transoral endoscopic pseudo cyst drainage.

Fig-15: pre-op photo showing pseudo cyst

Fig-16: external catheter drainage

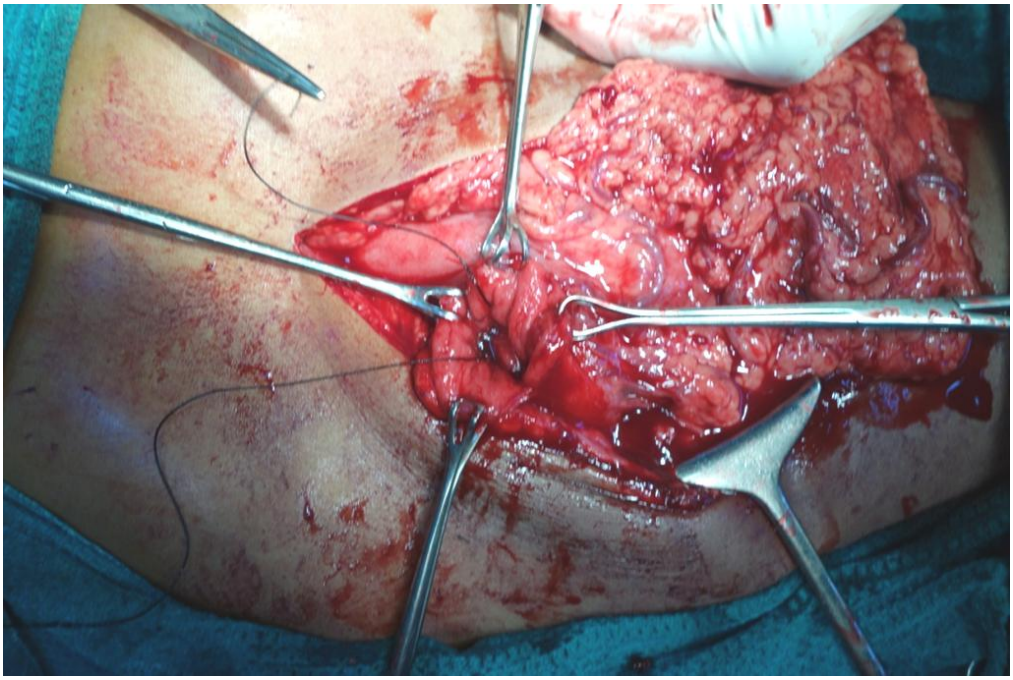


Fig-17-: posterior wall of stomach

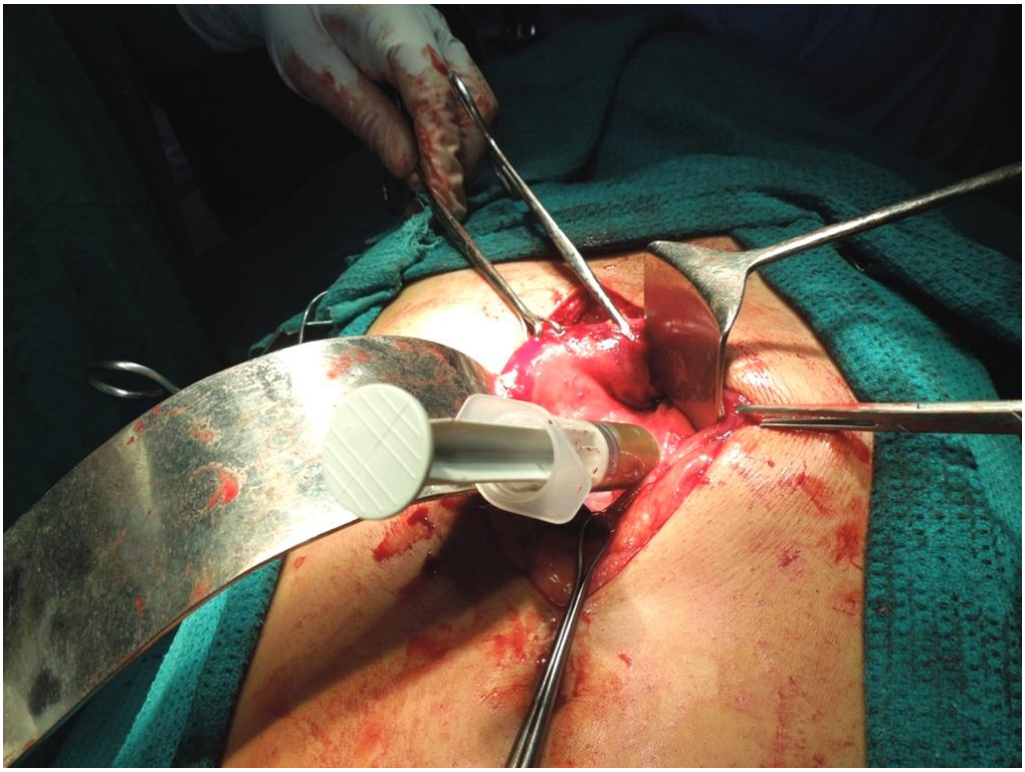


Fig-18: Cyst fluid aspiration

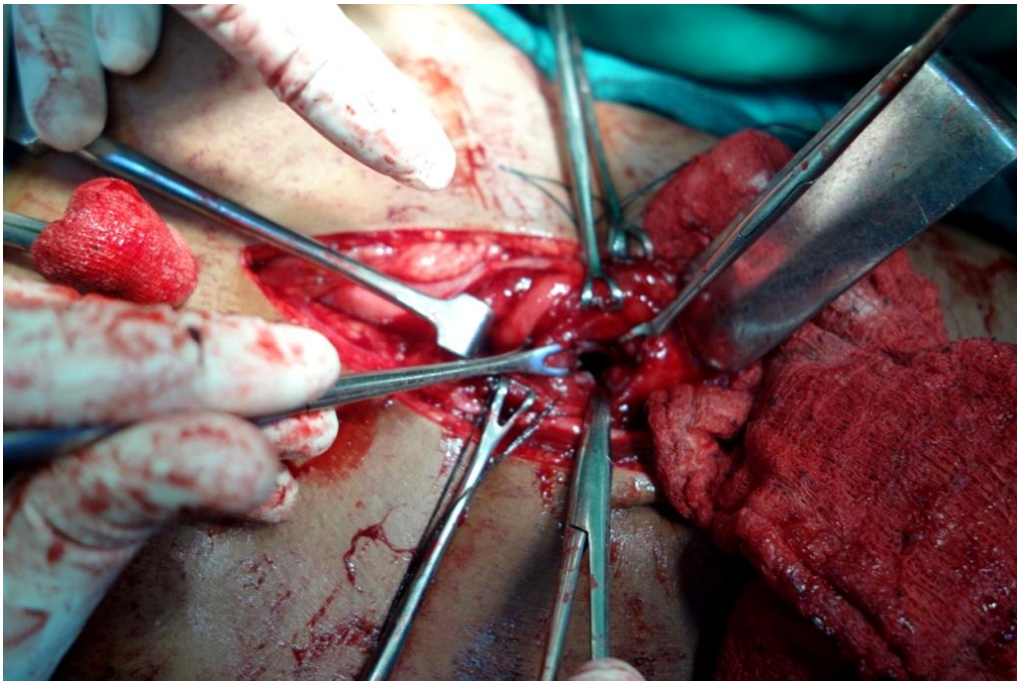


Fig-19: Cystogastrostomy

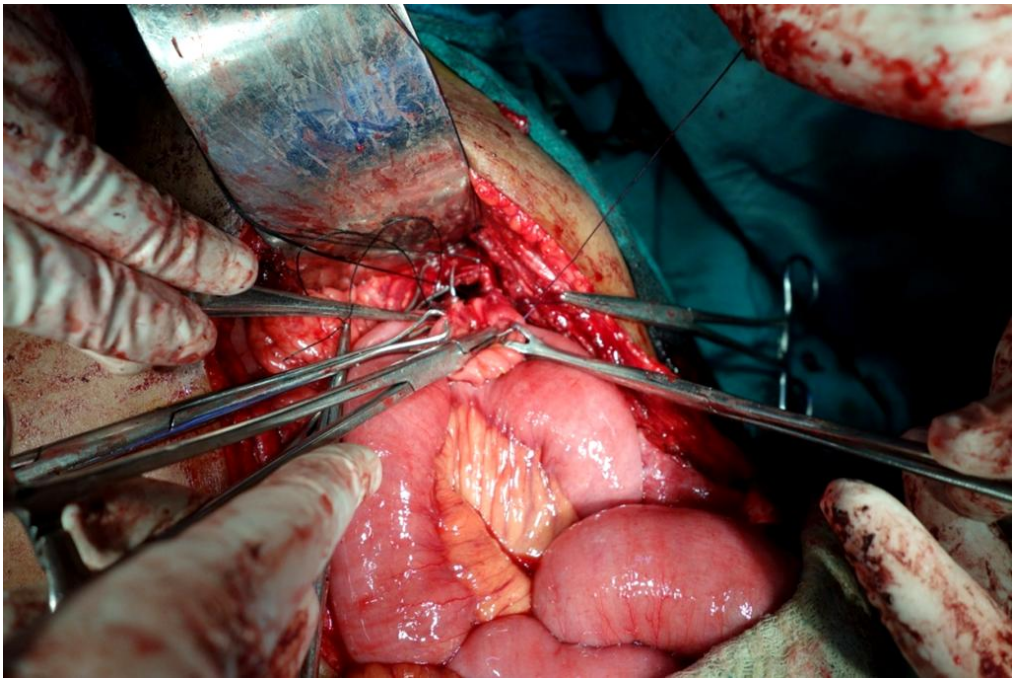


Fig-20: Cystojejunostomy

Pancreatic resection

Pseudo cysts located in the body or tail of the gland can be treated with distal pancreatectomy. Presence of Peripancreatic and peripseudocyst inflammation can make distal pancreatectomy a technically challenging procedure. After distal pancreatectomy, a Roux-en-Y pancreaticojejunostomy to the remnant pancreas may be required to decompress an obstructed or abnormal proximal pancreatic duct. In a few patients with symptomatic pseudo cysts associated with an inflammatory mass pylorus-preserving pancreatico duodenectomy is the procedure of choice, less commonly duodenum preserving resection of the head of the pancreas may be applicable in some patients.

External drainage

It is indicated for grossly infected cyst or when an immature, thin-walled pseudo cyst is encountered. One closed-suction drainage catheter is placed into the cavity and brought out through the abdominal wall. Appropriate antibiotic therapy should be instituted along with this procedure. Follow-up CT scans are obtained to ensure that the pseudo cyst is completely drained. It may lead to the formation of pancreaticocutaneous fistulas, most of them will heal spontaneously as long as the proximal pancreatic duct is not obstructed. Octreotide therapy

and total parenteral nutrition may help in closure of a persistent pancreaticocutaneous fistula.

COMPLICATIONS [18, 21, 23, 24, 27]

Up to 40% of the patients with pseudo cyst will develop complications if untreated. Infection, hemorrhage, obstruction or compression of adjacent structures, and rupture are the most common ones.

Infection

Aspiration of purulent fluid from the pseudo cyst confirms the presence of an infection. The bacteriology of a pancreatic abscess is highly variable, but up to 60% of these lesions contain gram-negative aerobic and anaerobic organisms. A pancreatic abscess is one clinical situation in which percutaneous drainage is clearly the treatment of choice. External drainage may become necessary in some patients.

Hemorrhage

It occurs in up to 10% of patients. The most common source of pseudo cyst associated bleeding is the splenic artery (up to 50%). Less commonly the gastroduodenal and pancreaticoduodenal arteries also account for a significant number of hemorrhagic events. Superior mesenteric or splenic vein and portal vein can also bleed but less

commonly. Bleeding is because of erosion of the vessel wall leading to pseudo aneurysm formation and eventual rupture. Initial management of a hemodynamically stable patient is attempted embolization of the pseudo aneurysm or source vessel. Patients with failed embolic therapy, with rebleed, or who are hemodynamically unstable require emergency surgical exploration. Arterial bleeding may require associated pancreatic resection. If resection is required, distal pancreatectomy, splenectomy, and splenic artery ligation is the most common procedures. Rarely, emergency pancreaticoduode nectomy may be necessary.

Obstruction [27]

It's a mechanical one and obstruction of the stomach, esophagus, jejunum, and colon also be identified. Obstruction of the mesenteric vasculature and the portal venous system (particularly the splenic vein) may lead to extra hepatic portal hypertension and subsequent splenomegaly and gastric varices. It may also obstruct the inferior vena cava and the ureters. Pseudo cysts with mediastinal and pleural extension impedes cardiac performance secondary to obstruction of preload or increased afterload.Congestive heart failure can occur following cardiac compression by a mediastinal pseudo cyst.

Rupture [28]

Spontaneous rupture

It is the least common complication and Occurs in less than 3% of patients, but it may give rise to dramatic clinical manifestations. Spontaneous rupture into the peritoneal cavity may lead to severe acute abdominal pain as a result of chemical peritonitis.

Silent rupture

Spontaneous resolution of pseudo cysts may occur by rupture or fistulization into a portion of the stomach or small bowel, similar to operative or endoscopic enteric drainage. So further therapy is not necessary in these circumstances. Pancreatic ascites or pancreatic pleural effusion may develop when it rupture silently anteriorly into peritoneal cavity or posteriorly into pleural cavity.

METHODOLOGY

Patients were selected from general surgery outpatient and inpatient department of Coimbatore Medical College Hospital. 30 cases of pseudo cyst of pancreas were selected from this hospital and the study was conducted among them from November 2012 to November 2013 over a period of one year.

INCLUSION CRITERIA

a) Patients diagnosed to have pseudocyst of pancreas by various investigations
b) Admitted patients of both sex and all age groups.

EXCLUSION CRITERIA

Neoplastic cystic swelling

Congenital cyst

Hydatid cyst of pancreas

MODE OF SELECTION

This study includes both adults and children. Patients with acute pancreatitis were monitored among those who develop pseudo cyst were selected and included in this study. Presence of pseudo cyst is confirmed

with USG.Patients with chronic pancreatic or Peripancreatic fluid collection without encapsulations were excluded.

The diagnosis in all patients was confirmed by USG abdomen. CT abdomen was done in some patients in whom the diagnosis was uncertain and or to define the extent of the disease and to detect associated complication if any.

Demographic data like age, sex, etc, were collected. All patients were admitted to serial USG monitoring to assess the evolution of pseudo cyst.

All patients with acute pseudo cyst were treated conservatively by withholding oral intake, giving i.v fluids, analgesics and antibiotics until the pain, vomiting and ileus subsides. They were then followed up; if the cyst does not regress they were subjected to surgical management once the cyst matures.

All the patients with mature cyst were treated surgically. Data like, duration of stay in conservatively treated patients and its result, type of surgical management and its result, complications developed if any, progress of the cyst were recorded.

RESULTS

Results obtained where analyzed as follows.

TABLE- 2: AGE DISTRIBUTION

Age	No. of patients	Percentage
<10	0	0
11-20	2	6.6
21-30	2	6.6
31-40	11	36.6
41 - 50	8	26.6
51-60	5	16.6
>60	2	6.6

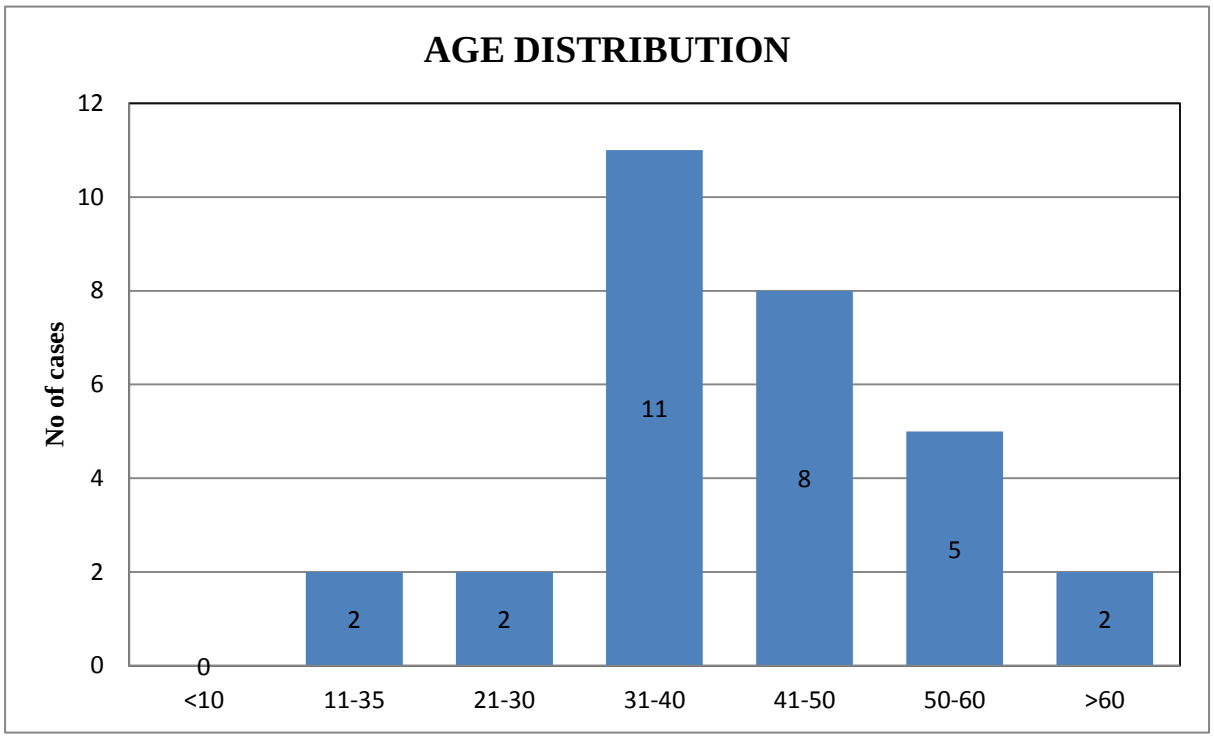
In this study of 30 patients, Pseudo cyst of pancreas is most common between 31 to 50years of age (63.2%) with a mean age of 40.5 years.

TABLE-3: SEX INCIDENCE

SEX	No. of patients	Percentage
Male	25	83.4
Female	5	16.6

In our study of 30 patients there were (25) males and (5) females and it is more common in males with a ratio of (5:1).

GRAPH-1: AGE DISTRIBUTION



GRAPH- 2: SEX INCIDENCE

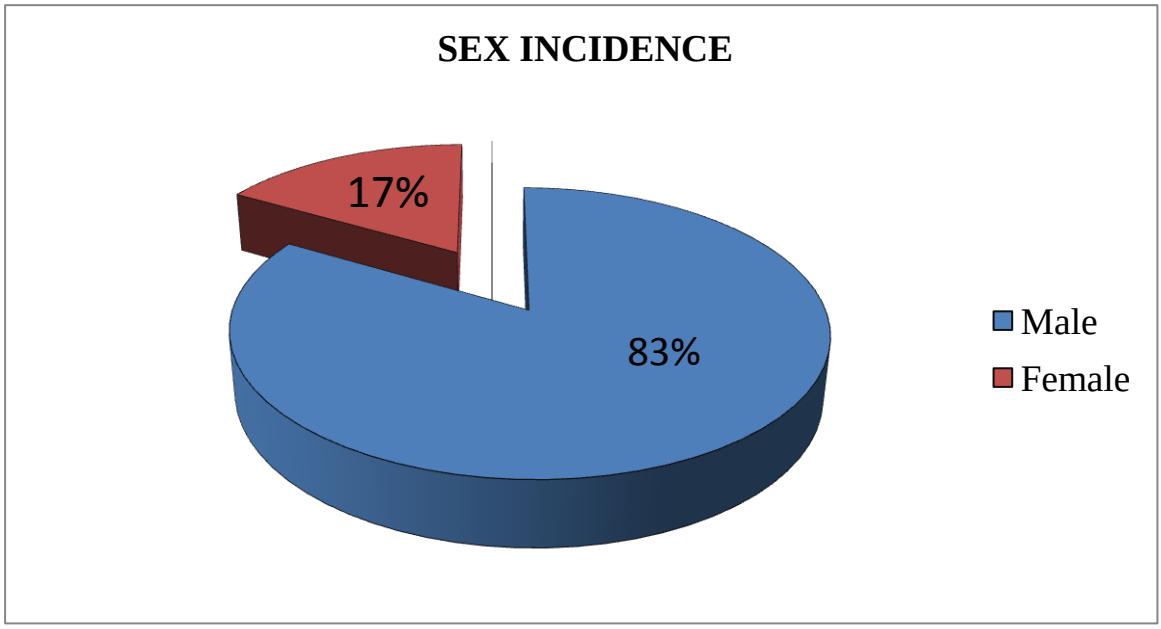


TABLE-4: SYMPTOMS

Symptom	No. of patients	Percentage
Abdominal pain	30	100%
Abdominal distension	14	46.6%
Nausea/vomiting	20	66.6%
Anorexia	10	33.3%
Fever	6	20%
Weight loss	5	16.6%
Jaundice	3	10%

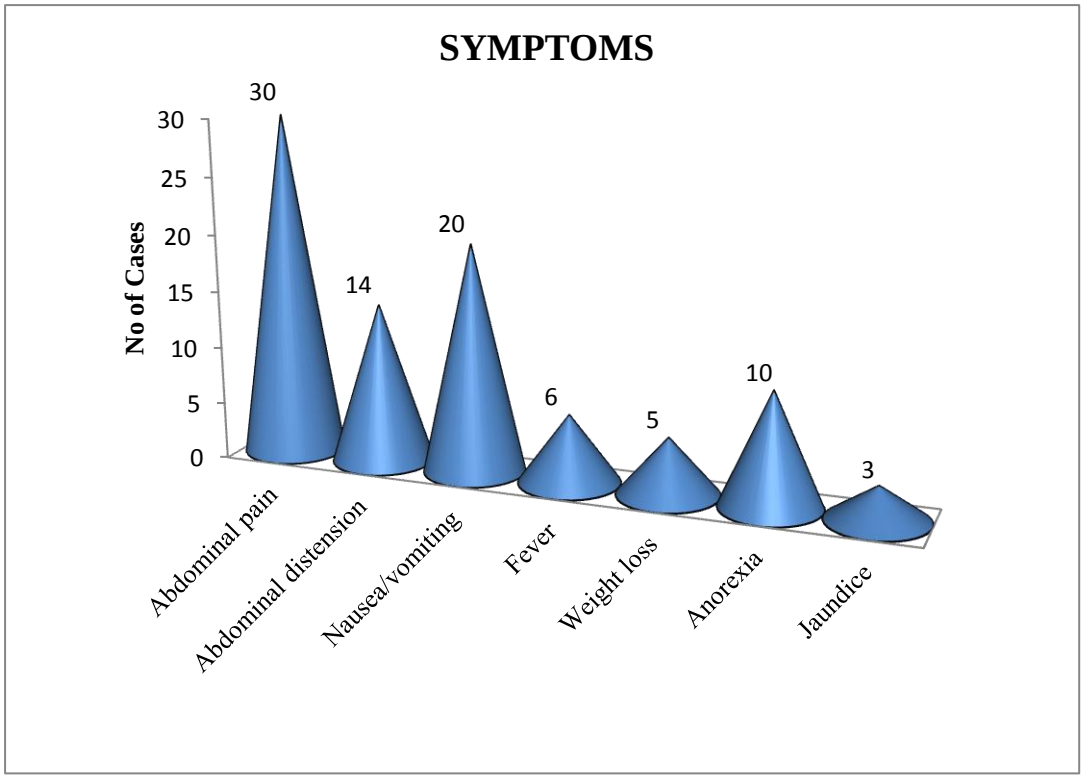
Commonest symptom was upper abdominal pain and was present in all patients (100%).nausea/vomiting (66.6%) was the second most common symptom in this study.

TABLE-5: SIGNS

Sign	No. of patients	Percentage
Mass abdomen	20	66.6%
Abdominal tenderness	25	83.4%
Ascites	4	13.3%
Ileus/intestinal obstruction	1	3.3%

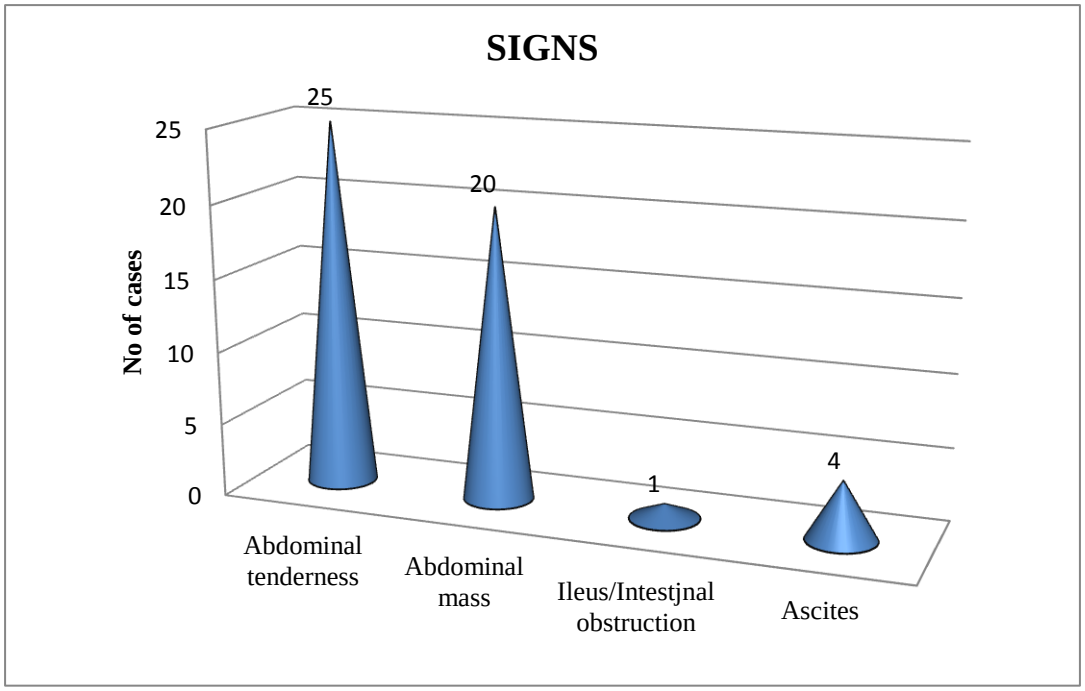
The commonest sign was upper abdominal tenderness and was present in almost all patients (83.4%) followed by abdominal mass which was present in 66.6% of the patients.

GRAPH-3: SYMPTOMS



Most common symptom of patient with pseudo cyst in this study was abdominal pain which was present in all patients (100%). Nausea/vomiting was found in 20 out of 30 patients (66.6%), abdominal distension was found in 14patients (46.6%).

GRAPH-4: SIGNS



Abdominal tenderness was the most common sign in this study which was present in 25 patients (83.4), followed by abdominal mass which was found in 20 patients (26.6%)

TABLE-6: RISK FACTORS

Risk factors	No. of case	Percentage
Alcohol	25	83.3%
Blunt trauma	1	3.3%
Idiopathic	4	13.3%

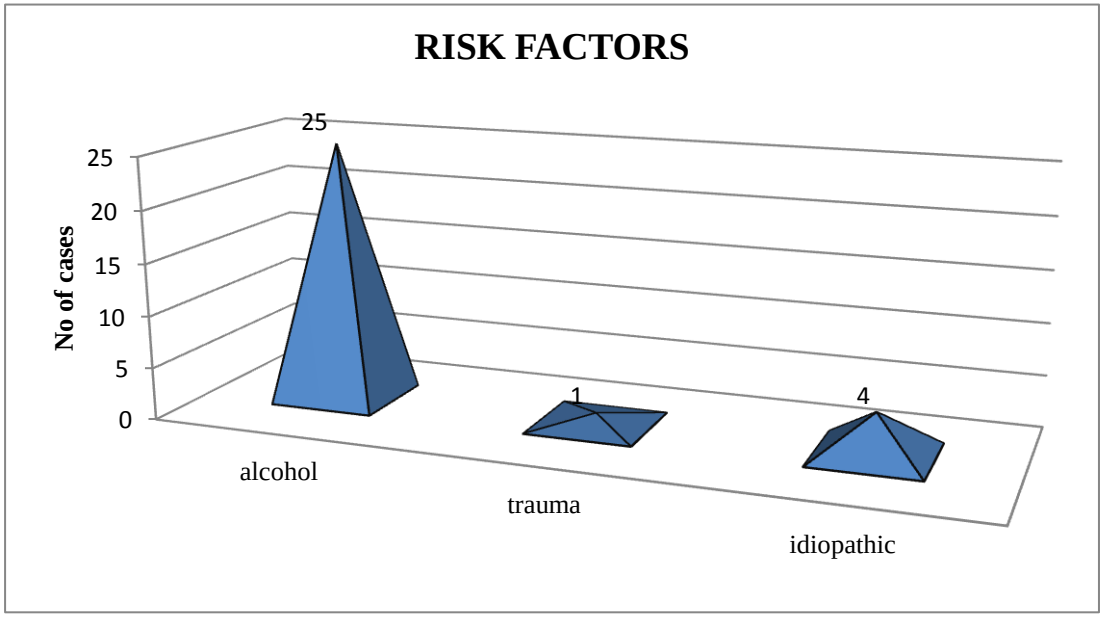
The commonest risk factor was alcohol consumption and was found in 83.3% of the patients followed by idiopathic in 13.3% and blunt trauma in one patient (3.3%).

TABLE-7: ASSOCIATED COMPLICATION

Complication	No. of cases	Percentage
Infection	5	16.6%
Ascites	4	13.3%
Ileus/Obstruction	1	3.3%
Rupture	-	-
Hemorrhage	-	-

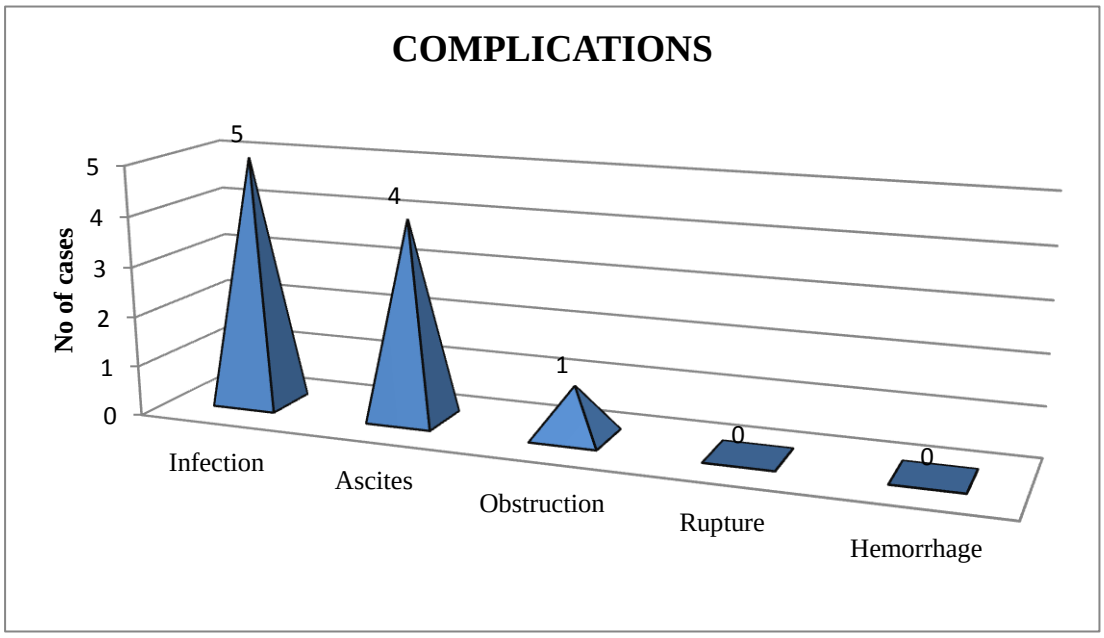
Infection was the complication found in 16.6% of patients followed by minimal Ascites (13.3%) and ileus/obstruction (3.3%) and there was no case of spontaneous rupture and or hemorrhage.

GRAPH-5: RISK FACTORS



Alcohol consumption was the most common risk factor (83.3%) found in this study which is the most common risk factor for pancreatitis and its complications (pancreatic pseudo cyst).second most common risk factor found was idiopathic (13.3%).

GRAPH-6: COMPLICATIONS



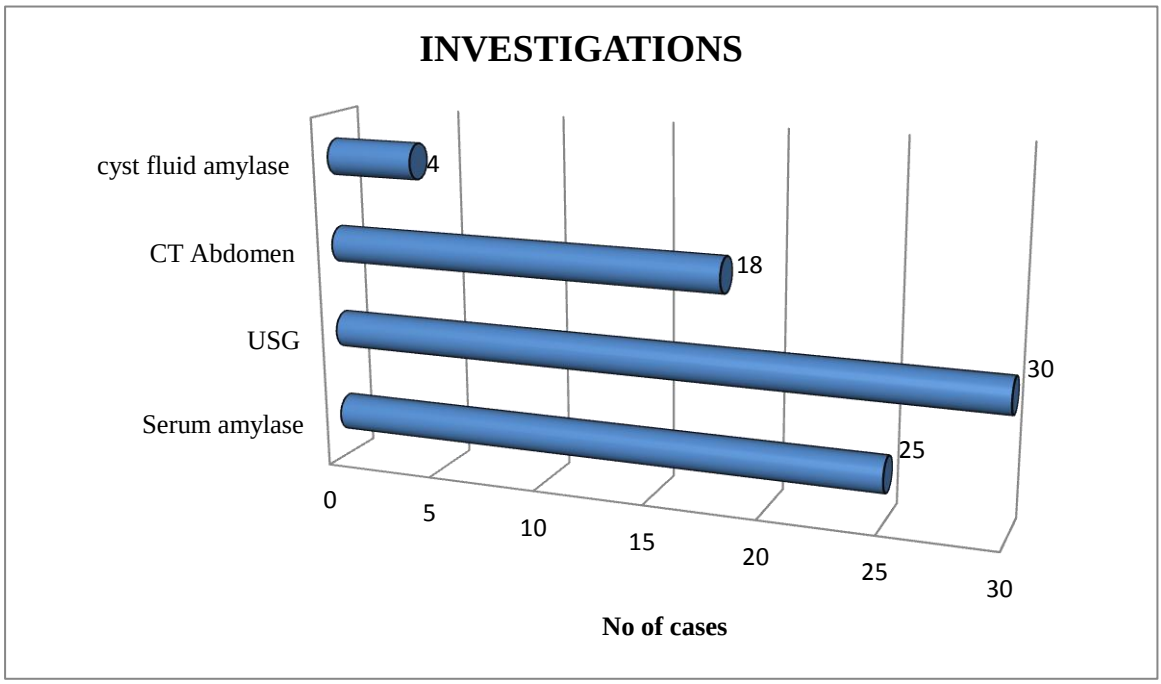
Infection of the pseudocyst was the most common complication found in this study which was found in 6 out of 30 patients (16.6%).Minimal Ascites was the second most common complication (13.3%).

TABLE-8: INVESTIGATIONS

Investigation	No. of cases	Percentage
Serum amylase	25	83.3%
USG(+ve)	30	100%
CT(+ve)	18	60%
Cyst fluid amylase	4	13.3%

Ultrasound was done as a basic investigation in all patients (100) and was positive in all patients. CT was done in 60% to identify the exact location, extent and associated complications. Serum amylase was found to be elevated in 83.3% of the patients and cyst fluid amylase was elevated in 13.3% of patients.

GRAPH-7: INVESTIGATIONS



USG was the most common investigation employed in this study and it detected pseudo cyst in all patients with the accuracy of 100%. CT scan was done in 18(60%) patients to detect the extension and associated complications if any. Serum amylase was found to be elevated in most of the acute pseudocysts.

TABLE 9: TREATMENT

Treatment	No. of cases	Percentage
conservative	14	46.6%
Percutaneous drainage	2	6.6%
Cystogastrostomy*	7	23.3%
Cystoduodenostomy	2	6.6%
Cystojejunostomy*	4	13.3%
External catheter drainage	2	6.6%

*One case: both cystogastrostomy and cystojejunostomy

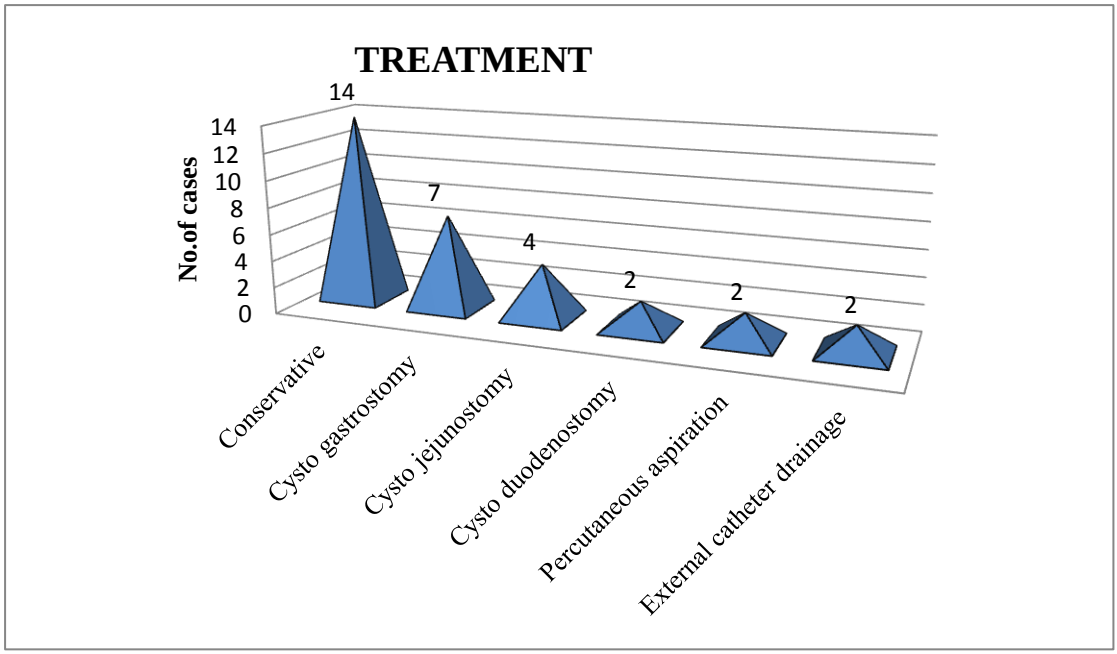
The commonest treatment for uncomplicated cyst was conservative in 46.6% of the patients. Cystogastrostomy was done in 23.3% of patients, cystojejunostomy in 13.3%, and cystoduodenostomy in 6.6%, percutaneous drainage in 6.6%, external catheter drainage in 6.6% of patients, 3.3% of the patients required both cystogastrostomy and cystojejunostomy.

TABLE-10: IMMEDIATE POST OPERATIVE COMPLICATIONS

Complication	No. of cases	Percentage
Wound infection	3	10%
Pain	8	26.6%
Vomiting	1	3.3%

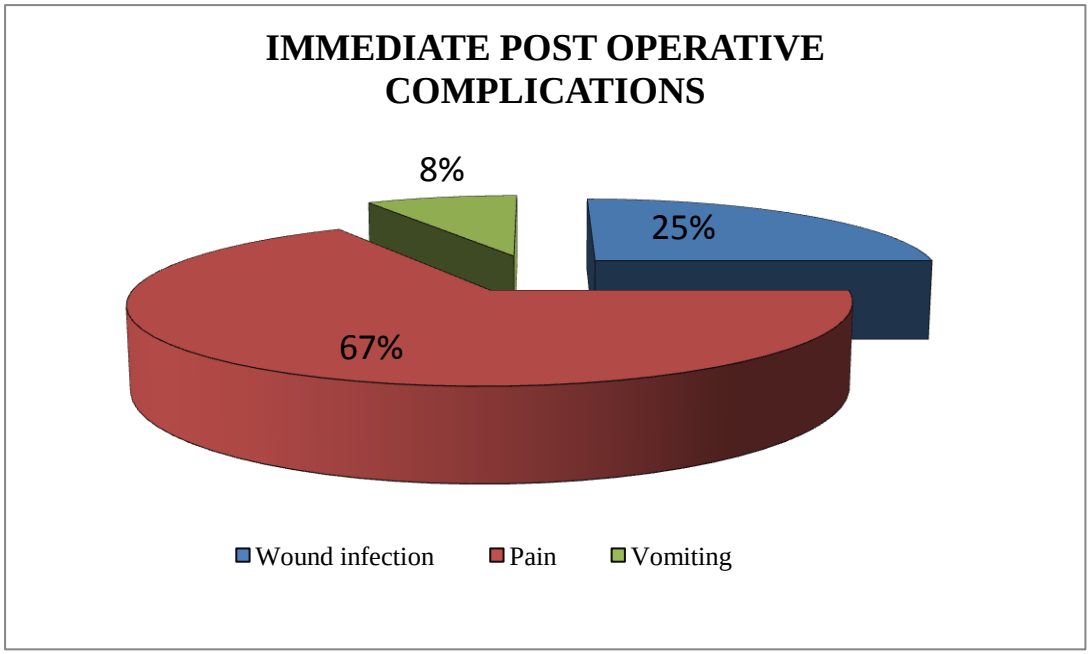
Immediate post operative pain was present in 26.6% of cases, wound Infection in 10% and vomiting in 3.3% of cases.

GRAPH-8: TREATMENT



Conservative management was the most common intervention done in uncomplicated cases while Cystogastrostomy (23.3%) was the most common surgical intervention done in patients with complication or cysts which were not regressed conservatively. Cystojejunostomy (13.3) was done in pseudo cyst which was not in contact with stomach.

GRAPH-9: IMMEDIATE POST OPERATIVE COMPLICATIONS



Pain was the most common postoperative complication found in this study (26.6%) followed by wound infection (10%) and vomiting (3.3%).

DISCUSSION

30 cases of pseudo cyst of pancreas have been studied all the 30 cases were in the adult age group.

Out of 30 cases 25 patients were male and 5 patients were female with a ratio of 5:1.This is compared with the study of V.Ustoff, et al (2000) and tuula kiviluoto, et al (1989).

Sex	**Tuula kiviluoto et, al**	**V.Ustoff et al**	**Present study**
Male	79.41	75	83.3
Female	20.58	25	16.6

Age distribution

In this study the common age group was between “31-50”, this is compared with tuula kiviluoto, et al (1989), V.Ustoff, et al (2000).

Age in years	**Tuula kiviluoto et, al**	**V.Ustoff et al**	**Present study**
Mean age	44	39	40.5

The commonest symptom was pain abdomen followed by nausea/vomiting. This is compared with the study group of tuula kiviluoto, et al (1989), V.Ustoff, et al (2000).

Clinical feature	**tuula kiviluoto, et al**	**V.Ustoff, et al**	**Present study**
Pain abdomen	67.67%	100%	100%

The commonest risk factor in this study was alcohol consumption.

Risk factor	**tuula kiviluoto, et al**	**V.Ustoff, et al**	**present study**
alcohol	85%	71.42%	83.3%

The commonest complication was infection followed by minimal Ascites. This is compared with V.Ustoff, et al (2000)

complication	**V.Ustoff, et al**	**Present study**
infection	8.03%	16.6%
Ascites	1.7%	13.3%

Treatment

Treatment commonly employed was operative intervention 53.3%.

This is compared with study group of

Treatment	Tuula kiviluoto et al	V.Ustoff et al	Present study
Internal drainage	18%	3%	43.2%
External drainage	38%	40%	13.2%

Treatment commonly employed in this study for uncomplicated cyst was conservative in 46.6% of cases, while surgical intervention was done in 53.4% of cases.

In this study the commonest post operative complication was pain abdomen followed by wound infection and vomiting; this is compared with the study group of tuula kiviluoto, et al (1989), V.Ustoff, et al (2000).

complication	tuula kiviluoto, et al	V.Ustoff, et al	Present study
Pain abdomen	29%	10%	26.6%
Wound infection	2%	4%	10%

Immediate post operative complication in this study includes, pain abdomen which is present in 26.6% of the patients and wound infection in 10% of the patients and vomiting in 3.3% of the patients.

In this study most of the patients were followed up to periods varying from 3-6 months. There were no complications except 2 patients were lost to follow up. Recurrence was found in two patients treated conservatively; both of them were on follow up.

SUMMARY

- Pseudo cyst of pancreas is a common problem in patients with both acute and chronic pancreatitis.
- Male patients continue to predominate with incidence of 83%.
- Highest incidence is in the age group of 31-50 years.
- Abdominal pain and tenderness was the most common symptom and sign respectively.
- Incidence of palpable mass was 66.6%. USG and CT scan detects pseudo cyst in all patients.
- Uncommon presentations were jaundice and minimal ascites.
- The most common etiological factor was alcohol consumption which was found in 83.3%, this is followed by idiopathic and blunt trauma.
- USG was the best investigation to detect pseudo cyst and was able to detect pseudo cyst in all patients though extent and associated complications were clarified by CT scan.
- Infection was the common complication present in16.6% of patients followed by ascites and obstruction with no cases of spontaneous rupture and or haemorrhage. Infected cases were treated with external catheter drainage.

- Pseudo cyst most commonly located in head followed by tail and body of pancreas.
- Conservative treatment is useful in all uncomplicated cases till they regress or till the cyst wall became mature.
- Cysts measuring >7cm required surgical drainage, cysts <5cms regressed with conservative management among which there are 2 cases of recurrence. Both of them were on follow up.
- The results of cystogastrostomy and cystojejunostomy were very good. The choice of treatment was based on the condition of the patient, location of the cyst and its content. External drainage was done in 13.3% of the patients with infection.
- Cystogastrostomy was done for cyst closely adhered to the gastric bed while cystojejunostomy was done to cyst unrelated to stomach.

CONCLUSION

- The disease was most commonly found in the age group of 31-50 years and was most common in males.
- Alcohol consumption was the most common cause of acute pancreatitis and the most common complication was pseudo cyst formation.
- Patients most commonly present with abdominal pain and abdominal tenderness.
- Ultrasonography was the most commonly used investigation with the accuracy of 100% in detecting pseudo cyst, which also useful for the follow up of patients.
- CT scan was useful in selected patients.
- Acute pseudocysts were treated conservatively and the cysts which were not resolved treated surgically. Infected cysts were drained externally.
- Enteric drainage was done, either by cystogastrostomy or cystojejunostomy in majority of patients with good results.
- Pain abdomen and wound infection were the most common post operative complications.

- Total duration of hospital stay ranges from 10- 15 days.
- Follow up done for 3- 6 months, two patients lost to follow up. Recurrence was found in 2 cases treated conservatively and they were on follow up.

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ANNEXURE- 1

PROFORMA

Name	:	Age/Sex	:
I.P. No.	:	Ward	:
Occupation	:	DOA	:
Income	:	DOS	:
Address	:	DOD	:

Presenting complaint :

1. Pain abdomen
2. Vomiting/nausea
3. Abdominal distension
4. Others

History of presenting illness :

1. Pain abdomen

Duration : Onset : Site :
Character : Radiation/Postural variation :

2. Abdominal distension

Duration : Diffuse/Localised :

3. Vomiting

Duration : Frequency :
Character : Vomitus :

4. Bowel and bladder habit :

5. Recent intake of alcohol :

Past History : DM/SHT/IHD/COPD/TB
Previous attacks

Personal history : Smoking
Alcohol
Betel nut

Treatment history :
Family history :
Menstrual history :

GENERAL PHYSICAL EXAMINATION:

1. Hydration :
2. Nutritional status :
3. Pallor :
4. Icterus :
5. Cyanosis/ clubbing/ edema :
6. Generalized/ regional lymphadenopathy :
7. Pulse rate :
8. Blood pressure :
9. Fever :

SYSTEM EXAMINATION :
ABDOMEN:

INSPECTION :

Shape : Symmetry : Movement :
Fullness :

PALPATION:

Warmth : Tenderness : Distension :
Guarding : Rigidity : Abdominal mass :
Abdominal girth : Hernial orifices : Renal Angle :

PERCUSSION :
AUSCULTATION :

Bowel sounds: Bruit:
EXTERNAL GENITALIA :
RECTAL EXAMINATION :
VAGINAL EXAMINATION :
CARDIOVASCULAR SYSTEM :
RESPIRATORY SYSTEM :
CENTRAL NERVOUS SYSTEM :
MUSCULOSKELETAL SYSTEM :

INVESTIGATIONS :

BLOOD: Urea : Sugar: Hb%:
TC : DC: PLATELET: LIPASE:
SERUM: Creatinine: Electrolytes: Amylase:
URINE : Albumin: Sugar: Deposits:

BLOOD GROUP :

X-RAYS: Chest: Abdomen: Others:

ECG :
HIV :
HBsAg :

ULTRASONOGRAPHY :

COMPUTED TOMOGRAPHY:

Others :

DIAGNOSIS :

MANAGEMENT :

CONSERVATIVE TREATMENT:

OPERATIVE TREATMENT :

Indication :
Surgery :
Date & Time of operation :
Anaesthesia :
Incision :
Per operative findings :
Procedure :
Post-op period :

COMPLICATIONS :

OUTCOME :

FOLLOW UP USG :

ANNEXURE- II

CONSENT FORM

It has been explained to me in my mother tongue and I completely understand my condition, its related complications and the treatment options available. I have been explained in detail regarding this study. I hereby give my consent to participate in the above mentioned study.

Date :

Place :

Signature of the relative

Name :

Signature of the patient

Name :

Signature of the witness

Name :

ANNEXURE -III

KEY TO MASTER CHART:

- Sl.No : Serial number
- Age : In years
- Sex : M-Male

  F-Female

- IP.no : Inpatient number
- Wt.loss : Weight loss
- Size : In centimeters
- S.Amylase : Serum Amylase
- USG : Ultrasonogram
- CT : Computed tomogram
- PCA : Percutaneous aspiration
- ECD : External catheter drainage
- Post.op : Post operative

MASTER CHART

SL.NO	NAME	AGE	SEX	IP NO	SYMPTOMS									SIGNS				RISK FACTORS			INVESTIGATIONS				COMPLICATION					TREATMENT					POST OP COMLICATIONS			FOLLOWUP
					ABDOMINAL PAIN	vomiting	ABDOMINAL DISTENSION	FEVER	JAUNDICE	ANOREXIA	WT LOSS	TENDER	MASS	SIZE	SITE	ASCITE	ILEUS	ALCOHOL	TRAUMA	IDIOPATHIC	S.AMYLASE	LIPASE	USG	CT	INFECTION	ASCITE	OBSTRUCTION	RUPTURE	HEMORRHAGE	CONSERVATIVE	PCA	DISTALPANCREATECTOMY	ECD	cystodochostomy	cystojejunostomy	CERVICOSTEROTOMY	INFECTION	PAIN	VOMITING	COMPLICATIONS
1	MARIYAPPAN	36	M	51516	+	+	+	-	-	-	-	+	+	9x7,8x6	head,tail	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	+	+	-	-	+	-
2	UDAYAKUMAR	30	M	64731	+	-	+	+	-	-	-	+	+	7x4	tail	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-
3	MUTHUSAMY	44	M	9178	+	-	-	-	-	-	-	+	+	5x6	head	-	-	+	-	-	+	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
4	CHINRAJ	65	M	7946	+	+	+	-	-	-	-	+	+	10x7	head	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-
5	DURGADEVI	20	F	34390	+	+	+	+	+	+	+	+	+	9x4,9x7	head,tail	+	-	-	-	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
6	MARAL	48	F	9145	+	-	+	-	+	-	-	+	+	7x6	body	-	+	-	-	+	+	-	+	+	-	-	+	-	-	-	-	-	-	-	+	-	+	-
7	KANAGARAJ	45	M	9517	+	+	-	-	+	-	-	+	+	8.4x5,4x5	head,tail	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-
8	SUBRAMANI	40	M	13639	+	+	+	-	-	+	+	-	+	7x4	tail	+	-	+	-	-	+	-	+	+	-	+	-	-	-	-	-	-	-	-	+	-	+	-
9	GANESH	23	M	64209	+	+	+	+	-	+	+	+	+	13.6x10	body,tail	+	-	+	-	-	+		+	+	+	+	-	-	-	-	+	-	-	-	-	-	-	IAST FOLLOW UP
10	KANNAPPAN	36	M	70447	+	+	-	+	-	-	-	+	+	12x7	head	-	-	+	-	-	+	-	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	LAST FOLLOW UP
11	SARAVANAN	39	M	65339	+	-	+	+	-	+	-	+	+	6x7	head	-	-	+	-	-	+	+	+	+	+	-	-	-	-	+	-	-	-	-	-	+	+	-
12	MARY	54	F	14704	+	+	+	-	-	-	-	+	+	7x8	head	-	-	+	-	-	+	-	+	+	-	-	-	-				-	+	-	-	+	-	-
13	MARIYAMMAL	67	F	45537	+	-	+	-	-	-	-	+	+	9x4,	body	+	-	-	-	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	+	+	+	-
14	NATARAJ	47	M	42981	+	+	+	-	-	-	-	+	+	5x4	head	-	-	+	-	-	+	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
15	ARUSAMY	60	m	62178	+	+	+	+	-	-	-	+	+	8x4	tail	-	-	+	-	-	+	-	+	+	+	-	-	-	+	-	-	-	-	-	+	+	-	-
16	RAJENDRAN	40	M	22406	+	+	+	-	-	-	-	+	+	11x7	head	-	-	+	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	+	-	+	-	-
17	ARUMUGAM	46	M	3961	+	-	+	-	-	-	-	-	+	9x4	tail	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
18	MAHALI	17	F	19894	+	+	-	+	-	+	+	+	+	11x7	head	-	-	-	-	+	+	-	+	+	-	-	-	-	-	-	-	+	-	-	-	+	-	-
19	KAMARAJ	40	M	45553	+	+	+	-	-	-	-	+	+	12x9	head	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-
20	CHANDRASEKAR	55	M	27245	+	-	+	-	-	-	-	+	+	7x8	head	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	RECURRENCE
21	MUTHURAJ	46	M	53946	+	+	+	-	-	-	-	+	+	3x2.5	head	-	-	+		-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
22	PRAKASH	38	M	55812	+	-	-	-	-	-	-	+	-	4x5.6	tail	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
23	RAVI	43	M	45546	+	-	-	-	-	-	-	+	-	3.6x1.8	head	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
24	MURUGAN	55	M	24550	+	+	-	-	-	-	-	+	+	6.2x2.4	body	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
25	VASUDEVAN	34	M	54897	+	+	-	-	-	+	-	-	-	4.2x2.6	head	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
26	SUNDARAM	50	M	59870	+	+	-	-	-	-	-	-	-	7x2.6	body	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	RECURRENCE
27	UMASANKAR	32	M	62762	+	-	-	-	-	-	-	-	-	1.7x2.6	head	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
28	RAMASAMY	51	M	51370	+	-	-	-	-	-	-	-	-	4.2x2.7	head	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
29	PRATAP	36	M	41721	+	-	-	-	-	-	+	-	-	2.1x1.7	body	-	-	+	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
30	SAKTHIVEL	40	M	37062	+	+	-	-	-	-	-	-	-	4.7x2.1	head	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-